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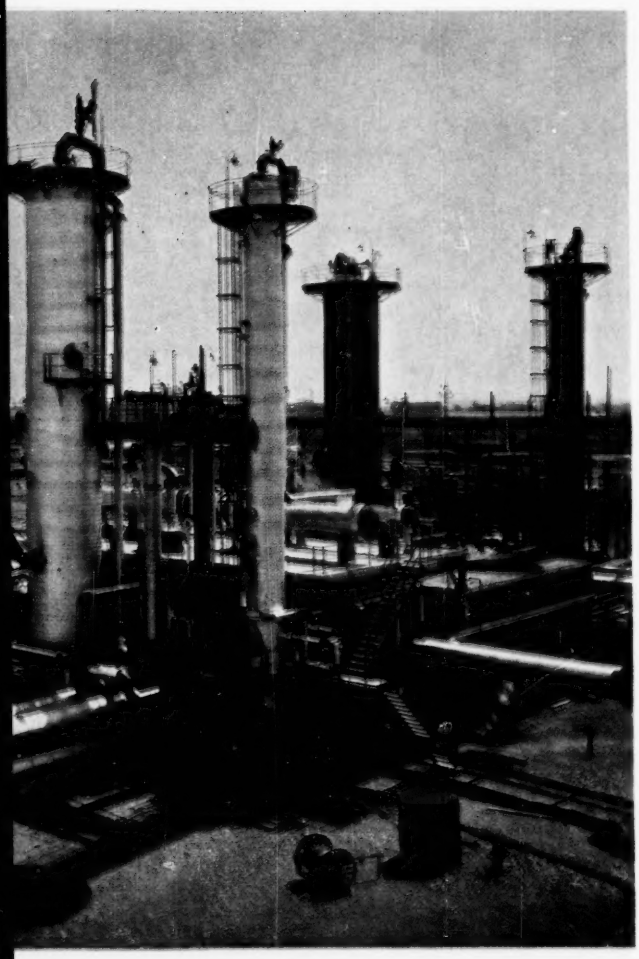
Chemical Week

June 28, 1958



German petrochemicals – infant industry is fast outgrowing its swaddling clothes. p. 21

Austria woos U.S. dollars, offers tempting incentives to American investors . . p. 33

Work simplification works for Dow. Aim: more economy, safety, productivity . . p. 47

Electroplating advance: new process puts smooth copper coat on rough surface . p. 55

Ethylene oxide processes vie for new plants. Here's how they compare . . . . . p. 74

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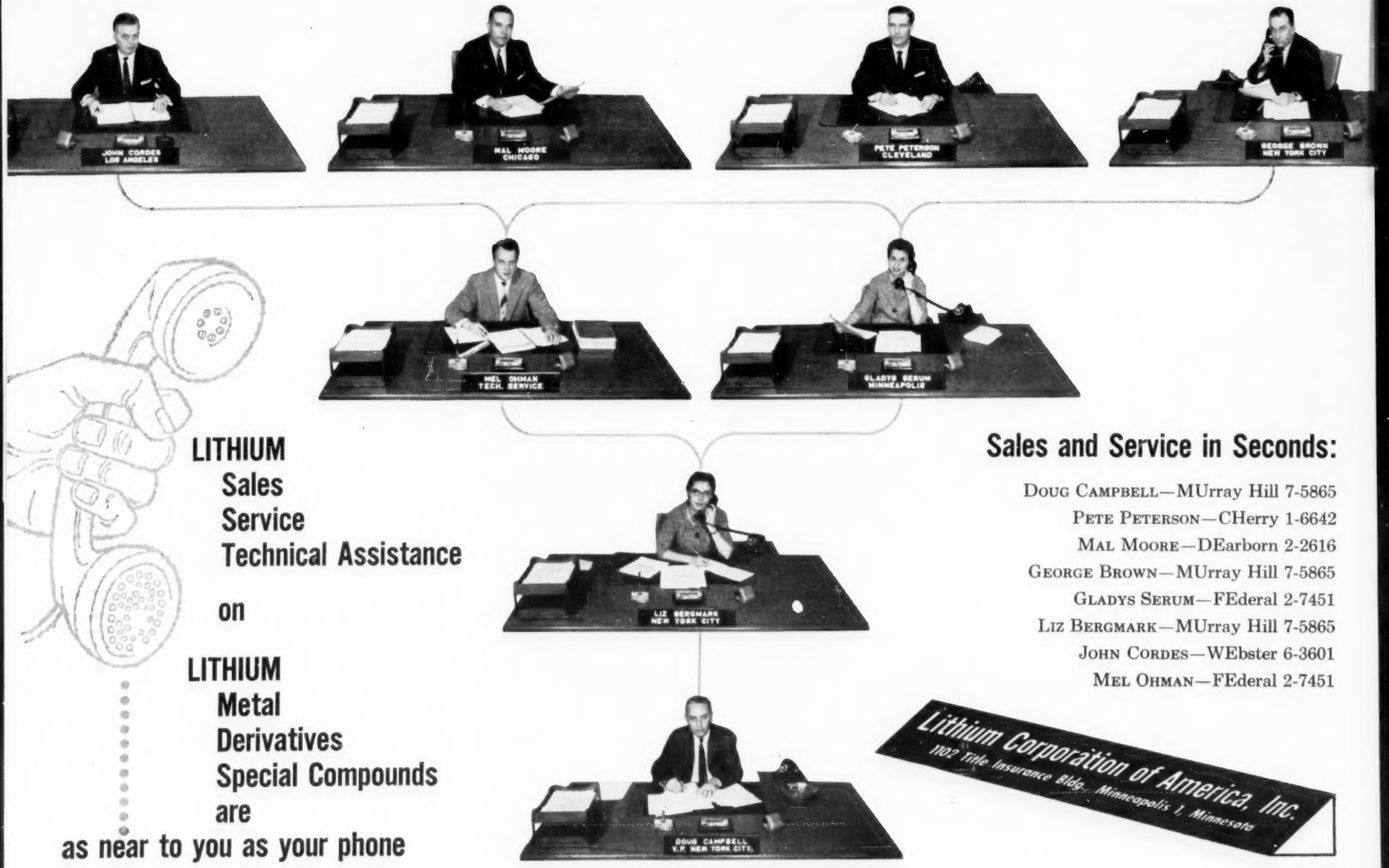

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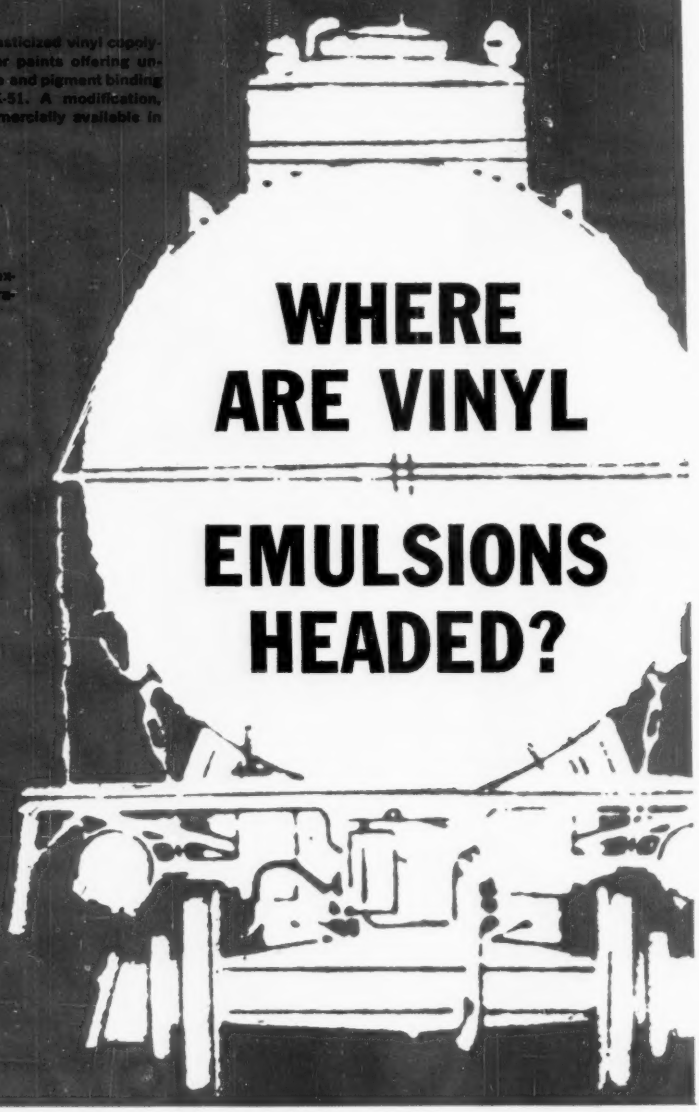

1958 ☐ Expect new successes in paints, papermaking, textiles, adhesives and chemical specialties. Trials are over. Volume is growing. Proof: Bulk buyers now account for 56% of National's sales. Their number has more than doubled since 1957.

1959 ☐ Expect exciting new polymers from new concepts in polymerization technology. Higher toughness, water resistance and pigment binding power are indicated by evaluations and scale-up studies now under way.

1960 ☐ Expect new directions and properties for industries already using vinyls — and elsewhere as well. Their source: Today's research momentum on new catalysts, new monomers, block polymers, graft polymers and new emulsifying systems.

Whatever your interest in vinyl emulsions, it's easy to put the unmatched know-how and nation-wide service of a pioneer producer to use. National's specialists are located in the cities listed below. For fast service, contact the one nearest you.

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Chemical Week

TOP OF THE WEEK **JUNE 28, 1958**

- **Morningstar-Paisley buys gum supplier, Thurston & Braidich.** It's M-P's sixth acquisition since '56 ..... **p. 43**
- **Ammonium nitrate demand may climb to 2.65 million tons** this year. Spur: fertilizer, explosive requirements ..... **p. 67**
- **Railroads okay light-gauge drums** for single-trip chemicals shipments. It may mean $45-65,000/year savings for CPI. . . **p. 71**

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21 West Germany's petrochemical expansion is slicing a U.S. export market.

23 International Minerals' youthful new president counts on functional reorganization of staff to spur expansion, diversification, research.

24 Encouraged by last week's Supreme Court ruling, Interhandel maps new attempt to recover General Aniline & Film.

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Austria's making a new bid for U.S. capital, offers some attractive investment opportunities.

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Ammonium nitrate output is heading for record 2.65-million-tons mark this year. Explosives demand swells fertilizer-based market.

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74 ENGINEERING
Two just-onstream ethylene oxide plants focus attention on race between air- and oxygen-oxidation processes.

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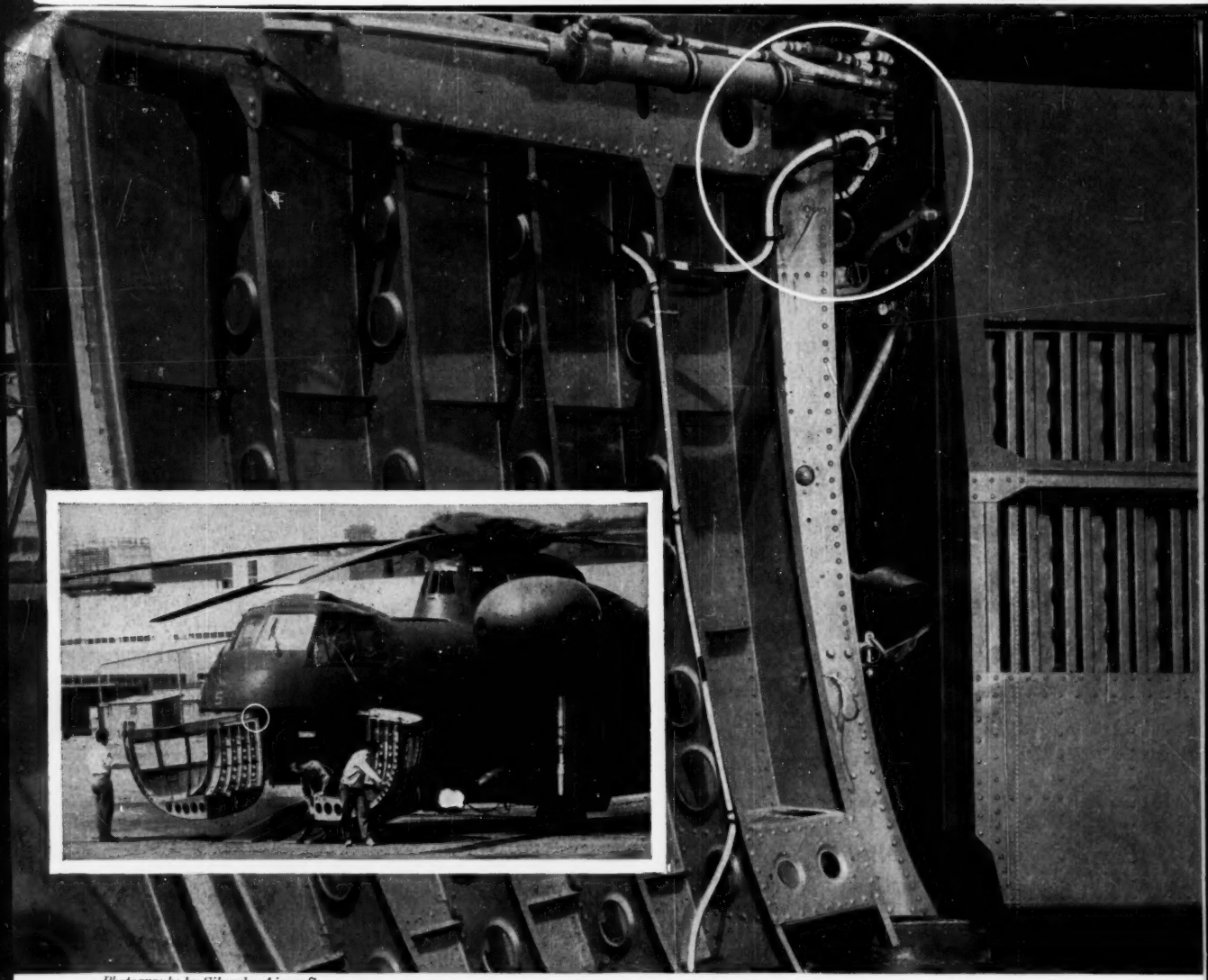


Photographs by Sikorsky Aircraft

Heat is high, space is limited, bends are sharp in today's complex electrical systems. In the S-56 helicopter, for example, cables snake through engine compartment, squeeze by cherry-red manifolds, loop over hinges to reach landing lights in clam shell doors. For this and comparably destructive environments, wire makers seeking to develop vinyl insulation with appropriate properties in thin section need better heat stabilizers . . . stabilizers with excellent dispersion, improved moisture resistance . . . stabilizers that provide greater volume resistivity, greater insulation resistance.

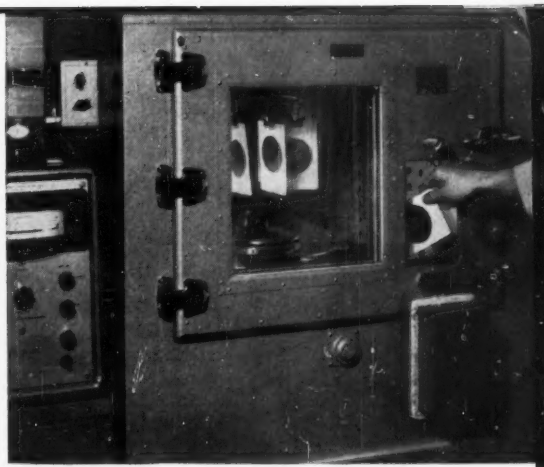
Dutch Boy® stabilizer research vinyl insulation tougher, more

These photographs show how National Lead research helps vinyl producers in one field . . . electrical insulation . . . overcome difficult stabilization problems and so broaden the market for their products.

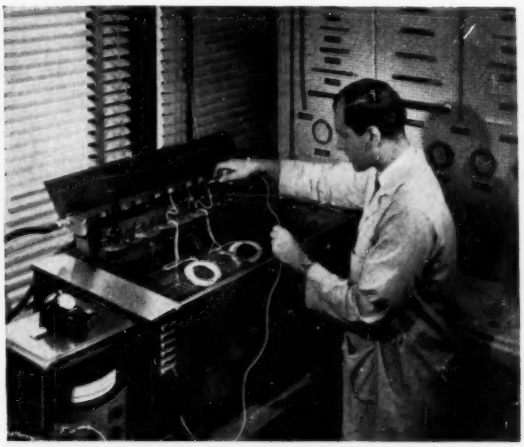
National Lead researchers do as much and more for producers of many additional vinyl products. Recently, for example, they came up with "Dutch Boy" stabilizer, Temex 3. This unique stabilizer provides both stabilizing and chelating action . . . greatly aids performance of vinyl flooring. Eighteen other "Dutch Boy" stabilizers boost the life or improve the usefulness of other vinyl products.

Get acquainted with useful, versatile "Dutch Boy" Chemicals. Write for handbook.

Researcher looks for tell-tale white in colored sample of proposed insulation. In this test, National Lead technician confirms that "Dutch Boy" stabilizer recommended for customer's proposed new thin vinyl insulation disperses properly. Improper dispersion would be signalled by white specks on background green of sample. Excellent dispersion is a principal reason for the wide use of "Dutch Boy" stabilizers when vinyls undergo very high heat in process or use and when maximum available stabilization action is needed.



Oven separates "men" from "boys". In this oven, researchers age various insulation compounds at slightly above service temperatures. Then they condition the compounds for one hour at 95°C and, at the same temperature, measure their volume resistivity. Aim of test is to determine compounds that will maintain maximum electrical resistivity. In the run shown above, "Dutch Boy" Dythal® stabilizer gave best results. This stabilizer does well in 8-mil, 105°C wire.



Immersion proves "Dutch Boy" stabilizer resists water and protects insulation. Using standard Underwriter's procedures, National Lead technicians put a customer's experimental high temperature insulation through water-immersion test. Commercially extruded wire is tested in 50 to 500 foot lengths. It must go weeks at voltage, show less than 10% resistance loss from all causes . . . including water absorption or scoring of thin coating by oversize particles that might have stuck in die. When properly stabilized with "Dutch Boy" stabilizers, thin stocks pass this test easily.

Insulation breakdown test at ½ of service thickness completes tests. After determining the most suitable stabilization for a proposed compound, National Lead is sometimes asked to run an insulation breakdown test. For this test, lengths of wire are produced by the customer with the insulation at ½ service thickness. Here you see a run in progress on 8-mil, 105°C stock protected by Dythal stabilizer. Better performance than ever before is now being obtained in thin, high temperature compounds. With further research, still higher values are expected.

helps make thin heat resistant

7 "Dutch Boy" stabilizers meet most vinyl insulation needs. Each of these products of National Lead research is a commercially proved product. Among them, you'll find the right stabilizer for all electrical and a variety of other opaque vinyl products.

Tribase* (Tribasic lead sulphate)	For high heat stability in vinyl electrical insulations.
Tribase-E* (Basic lead silicate sulphate complex)	An economical stabilizer for vinyl electrical insulation.
Lectro "60"* (Lead chlorosilicate complex)	Low vol. cost stabilizer for electrical insulation.
Lectro* 77 (Lead chlorophthalosilicate)	For a wide range of vinyl electrical insulation.
Lectro* 78 (Tetrabasic lead fumarate)	Outstanding stabilizer for high temperature uses.
Dythal® (Dibasic lead phthalate)	Outstanding stabilizer for 105° C — class insulation.
Dyphos® (Dibasic lead phosphite)	Outstanding anti-oxidant, heat, light and weather stabilizer.

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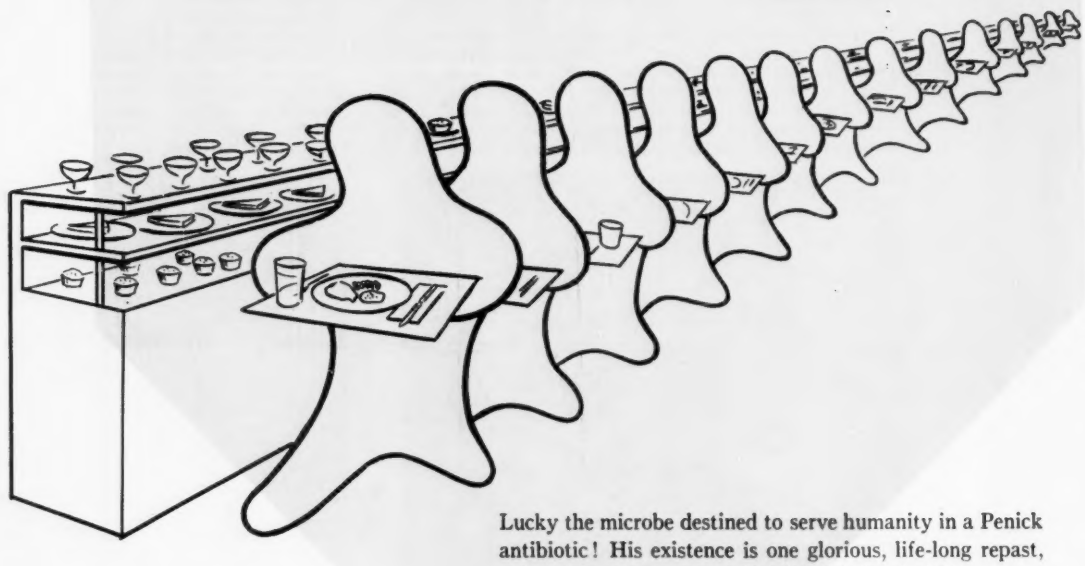

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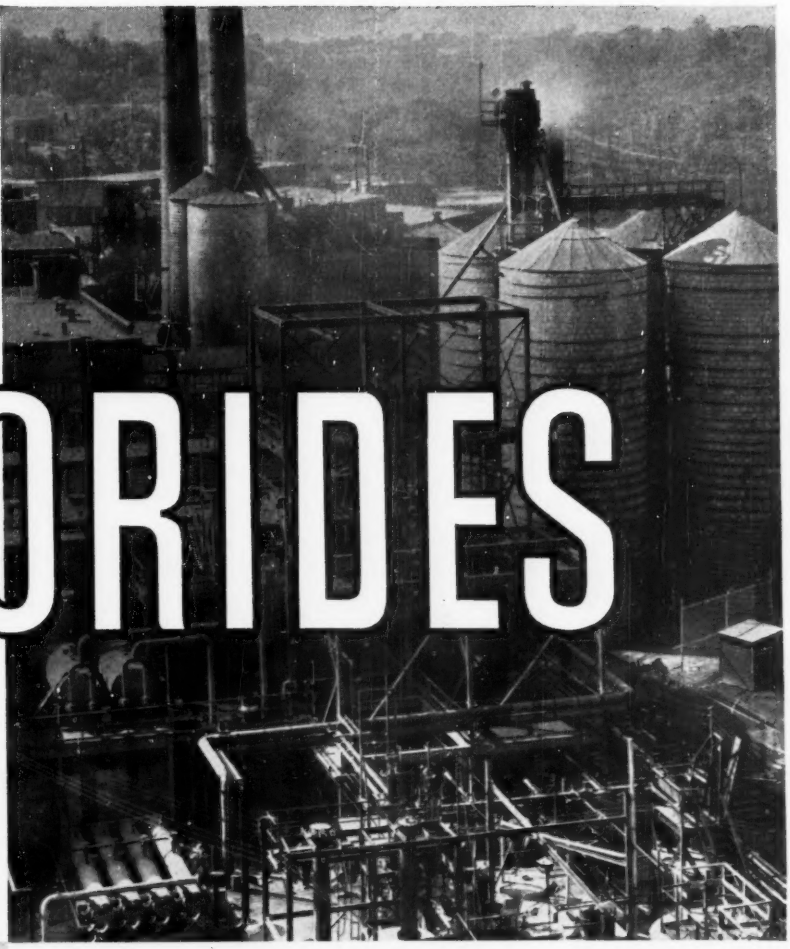

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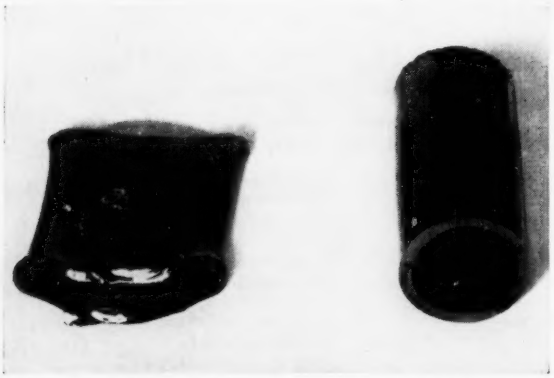

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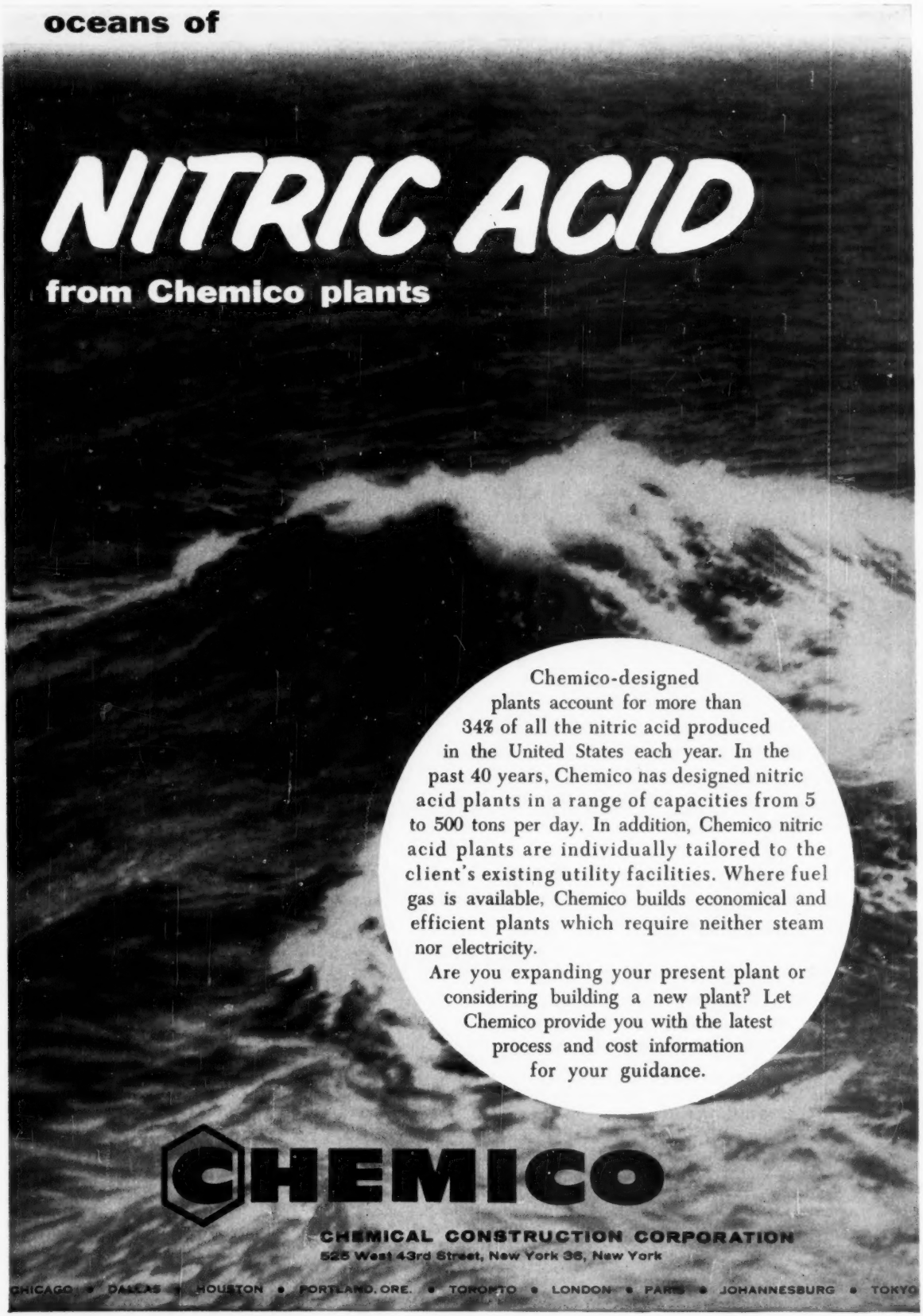
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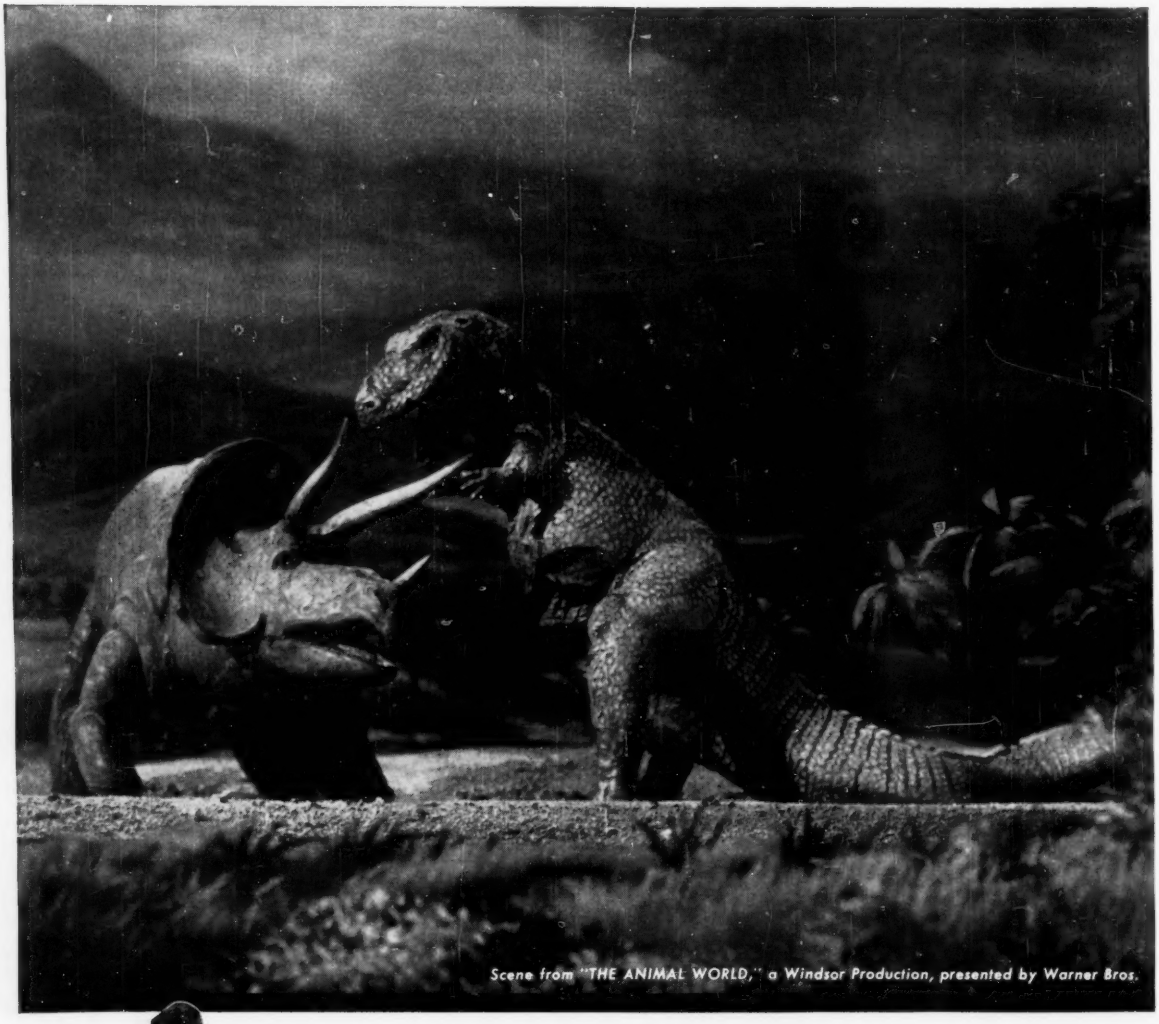

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THE BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

VIEWPOINT

"**HIGH TARIFFS** mean a higher cost of living for American citizens," said Cordell Hull, Secretary of State, who, in 1934, fathered the reciprocal trade program.

"By opening the gates of America's markets wide for the products of countries with relatively low wages and low standards . . . the ultimate result will be leveling . . . of living standards in all nations," says Monsanto's Edgar M. Queeny.

Paradoxically, these contradictory statements are both true. The catch is that Hull's hypothesis holds for the short term, whereas Queeny's prediction is inevitably true over the long pull.

It stands to reason that if a $2/-hour American worker buys goods made by a 50¢/hour European worker, he is essentially buying four hours' work for his one hour's pay, and his standard of living is accordingly increased.

But the inevitability of Queeny's thesis depends on the fact that trade implies a two-way traffic. And reciprocity of trade leads inexorably to reciprocity of wage levels and, hence, living standards. If imported dyestuffs, for example, are produced by 50¢/hour labor, U.S. makers must either reduce prices to compete or go out of business. The first alternative implies lower wages; the second means lost jobs.

Our industry wisely does not advocate a tariff wall of unvarying height; it simply seeks, on a selective basis, to impose tariffs that will safeguard American wages.

The American living standard is high. The productive capacity of other nations is not great enough, unfortunately, to support as high a standard. Equality, therefore, means a lowering of our own. Such equality "may be desirable," says Queeny; "it may be inevitable; but intellectual honesty requires that the American people be told of the goal, of the course, and of its result."

H C E Johnson

Editor-in-Chief

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KUDOS

For 'Extraordinary Impact'

Sidney D. Kirkpatrick, editorial director of CHEMICAL WEEK, added another line to his "Who's Who" this week as he, and four others, received a Founders Award from American Institute of Chemical Engineers.

"The awards," says AIChE, "are given to members of the institute who have extraordinary impact on chemical engineering and whose achievements have advanced the profession in any of its aspects."

Active in the institute for more than 30 years, Sid received its Silver Anniversary Medal in 1932. He has been a director for three terms, vice-president in '41, and president the following year. Right now he and MIT's Prof. Walter Whitman are co-chairmen of the institute's fund-raising drive for the United Engineering Center.

Sid's fellow medalists are Du Pont's Thomas Chilton, Dorr-Oliver's John V. N. Dorr, University of Wisconsin's Olaf Hougen, and MIT's Warren K. Lewis. To all of them, we extend heartiest congratulations. But for Sid, who has worked indefatigably for the progress of CHEMICAL WEEK since its start, we add a large measure of pride in the recognition of his accomplishments as an editor.

—THE EDITORS.

MEETINGS

Gordon Research Conferences, series of 36 topics, Colby Junior College, New Hampton School and Kimball Union Academy, all in New Hampshire, ends Aug. 29.

CERN, annual conference on high-energy nuclear physics, Geneva, Switzerland, June 30-July 5.

Western Packaging and Materials Handling Exposition, Civic Auditorium, San Francisco, Aug. 11-13.

American Soybean Assn. and **National Soybean Processors Assn.,** joint annual meeting, Fort Des Moines Hotel, Des Moines, Iowa, Aug. 18-20.

American Institute of Chemical Engineers and **American Society of Mechanical Engineers,** heat transfer conference, Northwestern University, Evanston, Ill., Aug. 18-21.

American Chemical Society, national meeting, Chicago, Sept. 7-12.

Institute of Textile Science, sixth scientific session, Physical Sciences Centre, McGill University, Montreal, Canada, Sept. 8.

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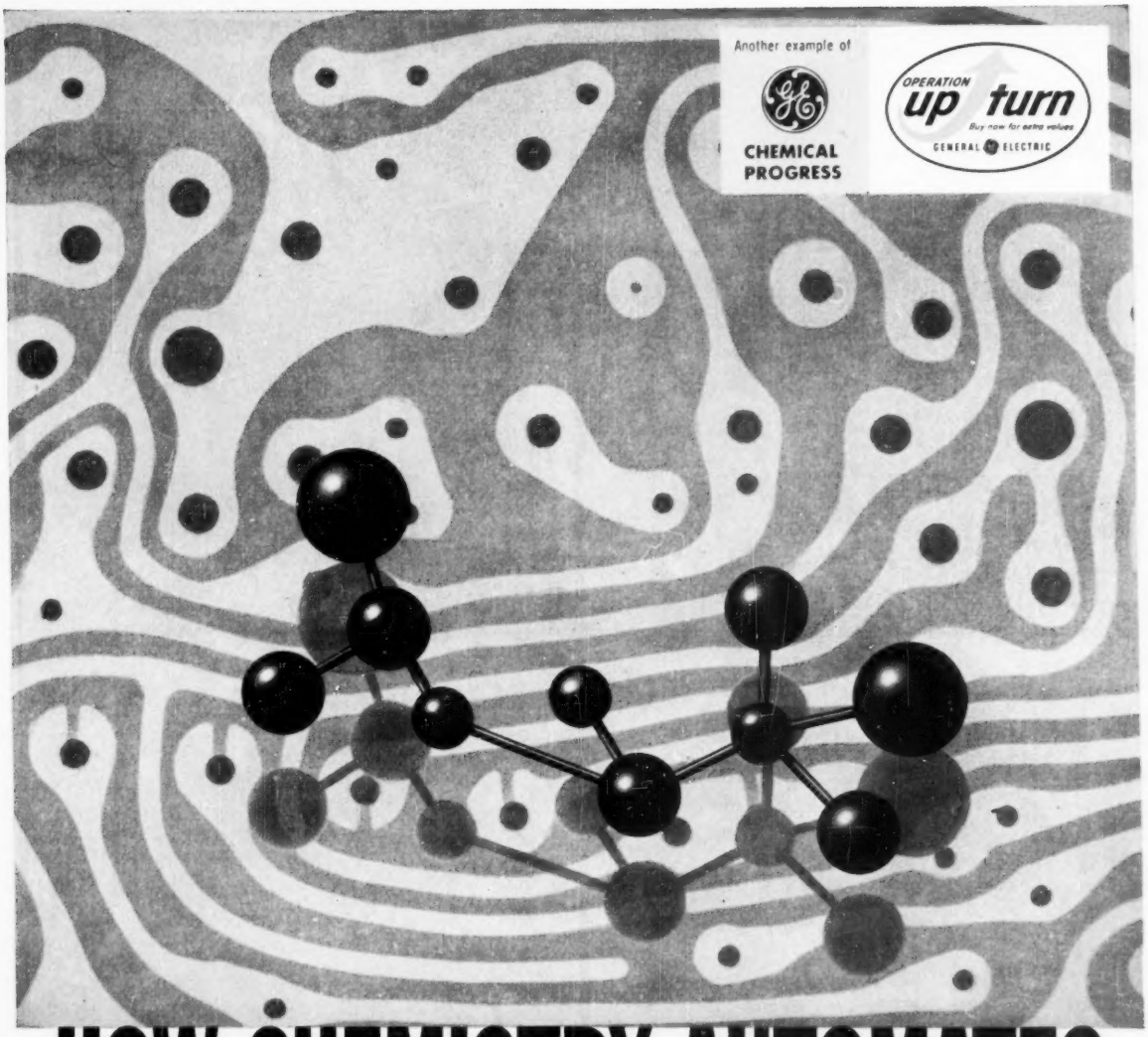

HOW CHEMISTRY AUTOMATES PRINTED CIRCUIT ASSEMBLIES

New G-E plastic laminates that withstand 500°F molten solder bath are helping radio and electronic makers put printed circuit assembly lines on a completely automated basis.

These copper-clad laminates are a development of General Electric chemical research. They have exceptionally good heat stability, high insulation resistance and can be precision punched at room temperature. Because the laminates won't blister at high temperatures, several manufacturers have been able to set up completely automated lines in which the printed circuits – with component leads inserted – are assembled by quick dipping in molten solder. One leading maker of car radios was able to reduce assembly time from 45 minutes to less than three minutes by switching to a heat-resistant G-E copper-clad laminate.

Through chemical research, General Electric has developed many new materials that can help you improve your product or process. For information on G-E copper-clad laminates, write Dept. LPD, CHEMICAL and METALLURGICAL DIVISION, General Electric Company, Coshocton, Ohio.

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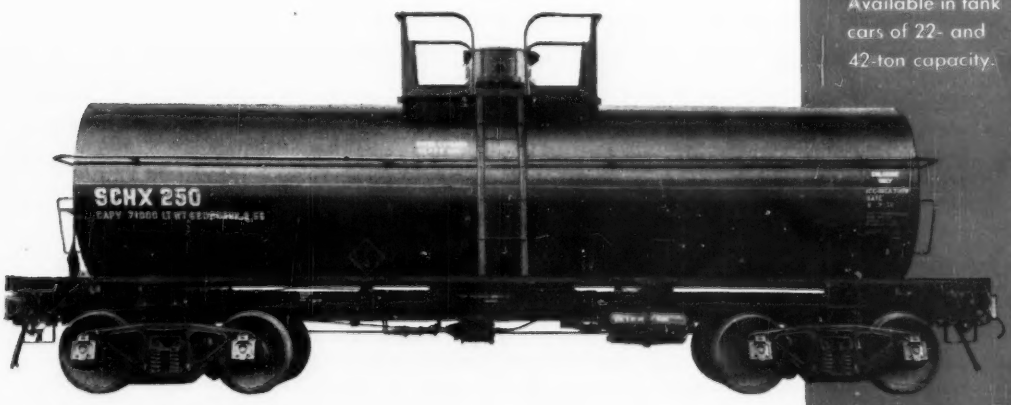

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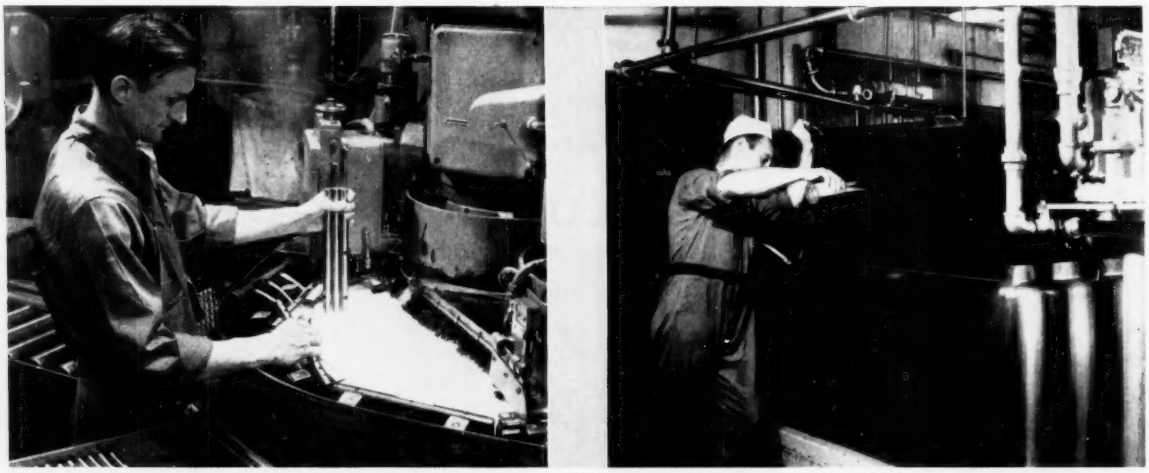

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Business
Newsletter

CHEMICAL WEEK
June 28, 1958

Things are moving fast at Air Reduction Corp. This company—which last week opened a new air separation plant in South Acton, Mass., and earlier this month revealed plans for a polyvinyl alcohol resin unit in Calvert City, Ky. (*CW, June 7, p. 15*)—is looking over possible sites in the Ohio Valley for a large new calcium carbide-acetylene plant. Airco's National Carbide Division would run the new unit; and though company officials emphasize that plans are still in the most preliminary stages, a possible site is St. Marys, W. Va.

The firm is also said to be actively considering two more plants for making liquid oxygen, nitrogen and argon, similar to the Acton unit. These would be built in Southern and Southwestern steel areas. But here, too, plans are not yet firm.

The 75-tons/day Acton plant dedicated last week cost $9 million, is Airco's fifth air separation and liquefaction facility in the U.S. It can also produce 5.6 million cu.ft./month of hydrogen and 100,000 cu. ft./day of acetylene. Most of the output is earmarked for Northeastern electronics and shipbuilding industries.

•

U.S. and Canada are tentatively agreed on moderate tolls for the St. Lawrence Seaway. The rates are expected to have a long-range effect on chemical industry economics in the Great Lakes area.

Vessels carrying bulk cargo will pay a toll of 42¢/ton on the cargo, 6¢/ton on the ship's weight. Process items defined as bulk cargo include pulpwood, woodpulp, liquids moving in ship tanks (such as liquid petroleum and chemical products), domestic package freight, sand, stone, coke and coal.

Proposed rates are designed to be permanent and to pay off seaway construction costs in 50 years. But the final o.k. on them is yet to come. Several user groups are already planning to argue against some of the tolls when hearings open in Washington and Ottawa Aug. 6.

•

Harvey Aluminum is sole bidder for the $26-million titanium plant—now government owned—in Chattanooga, Tenn. At the official bid openings held in General Services Administration's Atlanta office last week, the company offered to take over the plant, with a five-year lease and 50% of net operating profits. Whether Harvey's terms are acceptable must be ruled on by GSA's Washington office within two months.

•

Go-ahead for Union Carbide's once-postponed technical service lab was given last week. Construction of the Tarrytown, N.Y., unit was delayed last February (*CW Business Newsletter, Feb. 22*) "pending further study"; now the project is to be started in August, is due for completion by late '59 or early '60.

Two other process companies report signs of a pickup this week:

Wyandotte president Robert Semple says second-quarter sales are well ahead of the first-quarter rate—though still 8-10% below last year's sales. He predicts second-half volumes will come close to '57's, if the present business trend continues.

And Parke, Davis Vice-President David E. Mitchelson expects P-D's income to be up 12-15% this year, with sales rising about 10%. Mitchelson also revealed that the company has upped planned expenditures for the next five years to $50 million—$8 million higher than previous estimates.

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Shell Chemical will complete its expansion program at Norco, La. Cost: $10 million.

Installation of an acrolein plant and an acrolein-based glycerine unit will up glycerine capacity at Norco to 35 million lbs./year by late '59. As these new units come onstream, Shell will cut glycerine output at Houston, Tex., and shift feedstocks into production of other products such as epoxy adhesives and plastics.

•

In Europe's petrochemical boom, West Germany is well out in front *(p. 21)*, but other countries aren't sitting it out. Austria's state-owned Oesterreichische Stickstoffwerke AG. and Italy's Montecatini plan to set up Danubia Petrochemie AG., a $40-million joint venture at Schwechat, southeast of Vienna. First project: a $6-million unit to produce 5,000 tons/year of polypropylene.

•

A big increase in mass spraying of pesticides under federal-state sponsorship is in prospect for next year, following the government's victory this week in the DDT-gypsy moth case in federal district court, Brooklyn, N.Y. *(CW, Feb. 8, p. 97).*

A U.S. Dept. of Agriculture spokesman says Judge Walter Bruchhausen's finding—that mass spraying to eradicate the gypsy moth is a proper exercise of the government's police power and that DDT, as used in this campaign, is not harmful to humans, animals or crops—"gives us an opportunity to go ahead with our original program." In addition to combating the gypsy moth in the Northeast, USDA is using large-scale spraying against grasshoppers in the West and fire ants in the South. At press time, the antispraying groups had not decided whether to appeal the decision.

•

Latest word on issuance of the long-awaited antibiotic pricing and distribution study by Federal Trade Commission: soon after June 30.

•

For investors, the chemical industry was one of the brightest spots in the cash dividend picture in May. Payments by makers of chemicals and allied products were $30.9 million, a 6.9% increase over May '57.

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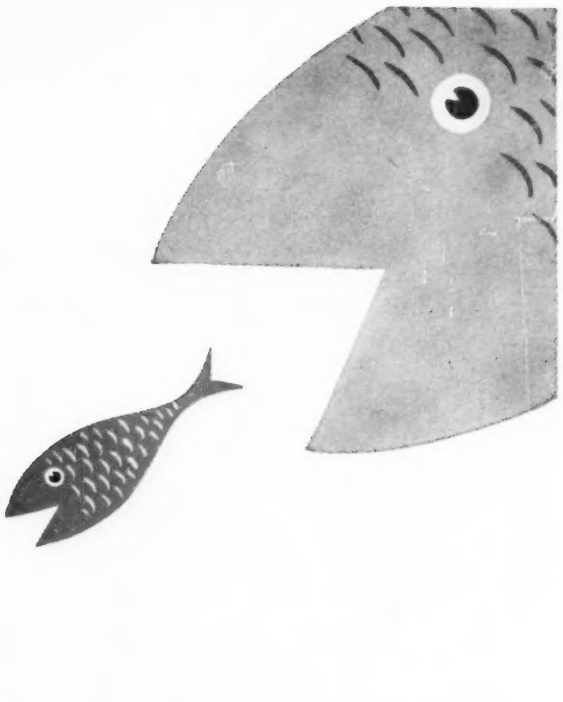

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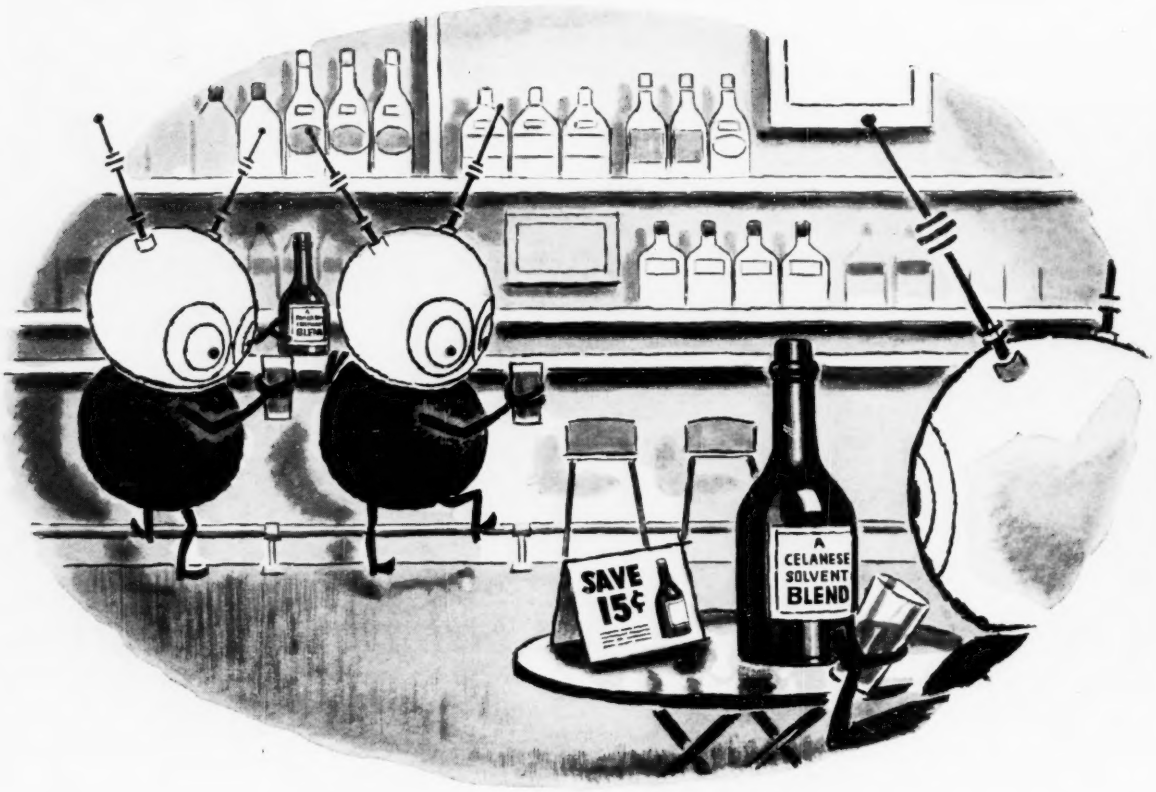

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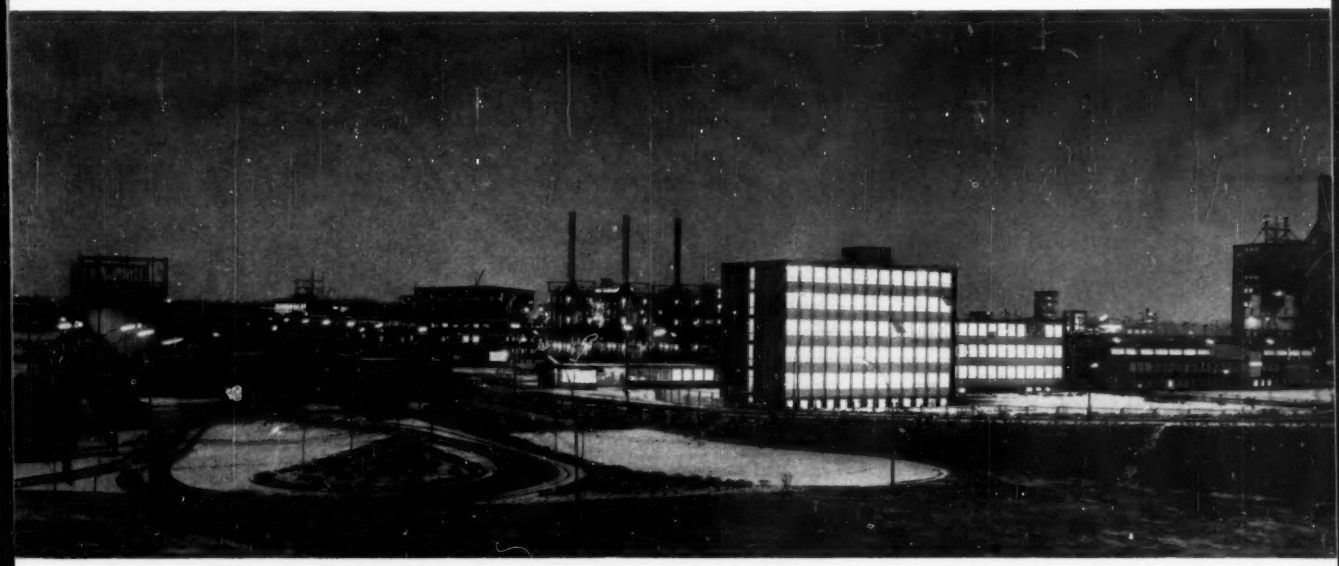
Chemical Week — June 28, 1958



Night view of expanding West Germany petrochemical pioneer Rheinische Olefin-Werke, at Wesseling.

Putting Pinch on U.S. Petrochemical Exports

By this week, U.S. petrochemicals producers could hardly avoid a sobering conclusion about the future of their biggest foreign market. Exports to Europe, steadily on the upswing since World War II, will likely level off next year as big new German petrochemical plants come onstream.

With both the chemical and petroleum industries flourishing in West Germany, it's not surprising that petrochemical development is also spurting ahead. Here's the trend: West German petrochemical production—which was virtually nonexistent until after 1945—tripled from 55,000 tons in '53 to 165,000 tons last year; and projects now under construction (*table, p. 22*) are expected to almost double the '57 output.

German chemical and petroleum companies—often working together in joint ventures—have invested about $170 million in petrochemical plants to date, and will lay out an additional $100 million by the end of next year. And these figures do not include cost of converting existing equipment to petrochemical processes.

Turning Tide: So far, Germany and western Europe in general have been good customers of U.S. petrochemical makers. But they foresee that the tide is about to turn, and are preparing to adjust to the new conditions.

For instance, Standard Oil of New Jersey—which has been shipping Enjay petrochemicals to Europe—next year will be a producer in Germany through its affiliate, Esso AG. At Cologne, Esso is at the halfway mark in construction of what will be West Germany's largest refinery, with a crude-oil capacity of 68,500 bbls./day. This refinery's chemical section—due to be completed next June—will be a substantial producer of butadiene and ethylene.

Another indication of what lies ahead: a U.S. chemical trading concern recently canvassed some of its customer companies in western Europe to see whether it should begin exporting petrochemicals to that continent, but the trader received a counteroffer—that it take part in shipping European petrochemicals to South America.

Coal Still on Top: Though oil and gas are becoming increasingly important in the economy, Germany is still basically a coal country. And while petrochemical development is now in full swing, the nation's long-famous coal-chemicals industry is not standing still. One example: Scholven-Chemie AG. (Gelsenkirchen) is setting up a 6,000-tons/year polyethylene plant (Ziegler process) that will operate on ethylene coming exclusively from coke furnaces.

But petrochemical expansion is gaining momentum from the lightning growth of the German petroleum industry. A sevenfold growth of oil consumption—from 105,000 bbls./day in '52 to an estimated 740,000 bbls./day in '65—appears to be under way. Refinery capacity has more than quadrupled since '50, now stands at more than 350,000 bbls./day; and continuing expansion is expected to meet the entire domestic demand anticipated for '65.

Trail-Blazer Keeps Moving: Typically, the first purely petrochemical project in West Germany—Rhein-

These U. S. exports will be hit by . . .

PRODUCT (ALL SOURCES)	Exported from U.S. 1952	1957
Benzene		
Total exports	0.2 million gal.	**2.7 million gal.**
Exports to Germany	———	**0.03 million gal.**
Phthalic anhydride		
Total exports	9.2 million lbs. (†)	**22.3 million lbs.**
Exports to Germany	0.05 million lbs. (†)	**3.9 million lbs.**
Styrene polymers and copolymers*		
Total Exports	24.9 million lbs.	**63.1 million lbs.**
Exports to Germany	0.35 million lbs.	**2.1 million lbs.**
Vinyl and vinyl copolymer resins**		
Total Exports	39.0 million lbs.	**48.4 million lbs.**
Exports to Germany	0.2 million lbs.	**1.7 million lbs.**
Ethylene glycol		
Total exports	44.4 million lbs.	**136.6 million lbs.**
Exports to Germany	———	**13.5 million lbs.**
Ethyl alcohol		
Total exports	0.2 million lbs.	**25.7 million lbs.**
Exports to Germany	———	**20.1 million lbs.**

†1951 export figures used because '52 exports and production were decreased due to work stoppage.
*Styrene content 60% or more.
**Includes uncompounded, compounded and semifinished resins.

Rising German petrochemical output

(Annual capacity of current expansion and construction projects)

Company	Products	Present	By 1959
Bunawerke Huels	GR-S-type rubber	(under construction)	70,000-90,000 tons
Chemische Werke Huels	Polyethylene (low pressure)	360 tons (pilot plant only)	7,200 tons
	Polypropylene	(under development)	(experimental and sample quantities)
Erdoel-Chemie	Neoprene-type rubber	3,000 tons	12,000-15,000 tons
	Ethylene, ethylene oxide, propylene, butylene, butadiene	(under construction)	300,000 tons (crude throughput)
Farbwerke Hoechst	Acetylene, ethylene	(under construction)	
	Ethylene oxide, ethylene glycol	(under construction)	
Rheinische Olefin-Werke	Polyethylene (high pressure)	10,000 tons	35,000 tons
	Epoxy resins	(under construction)	2,000 tons

ische Olefin-Werke GmbH. (Wesseling)—was a joint venture by an oil company and a chemical company. Parent companies: Badische Anilin- & Soda-Fabrik (Ludwigshafen), which had been developing petrochemical processes even before World War II, and Deutsche Shell AG. (Hamburg).

This petrochemical pioneer keeps right on growing. It's putting some $33 million into expansion of polyethylene capacity to 35,000 tons/year, and is building a 2,000-tons/year epoxy resins unit. Both projects are to be completed by December.

Aside from its 50% participation in ROW, BASF is active in petrochemical production at its own works. At Ludwigshafen, this company turns out ammonia, polyethylene, polystyrene, propionic acid, butyraldehyde and butanol; and there have been indications that the company is considering an acrylic acid unit.

Second Oil-Chemical Partnership: Following BASF's lead, Farbenfabriken Bayer (Leverkusen) joined hands with refinery owners—in this case, Petroleum GmbH. and BP Benzin—to form a petrochemical joint venture known as Erdoel-Chemie GmbH. (Dormagen). First stage of construction of this subsidiary's cracking plant will be completed before the end of this year. Annual throughput of 300,000 tons of crude or crude fractions will be processed into ethylene, ethylene oxide, propylene, butylene and butadiene.

Chemische Werke Huels won't reveal figures, but some say it's the biggest German petrochemical producer. The company claims to be No. 1 in polyvinyl chloride.

Also, Chemische Werke Huels is said to be the world's only producer of acetylene by the electric arc method, is expanding in polyethylene, will market polypropylene soon.

It has a 50% stake in Europe's largest synthetic rubber plant, the 70,000-90,000-tons/year GR-S plant due onstream this summer at Marl. It will be operated by Bunawerke Huels GmbH., whose other parent companies are BASF, Bayer and Farbwerke Hoechst.

Hoechst, another member of the industry's "big four," has built a 200,000 - 300,000 - tons/year distillation plant that eventually will be used entirely for petrochemicals. Next year, Hoechst plans to put onstream a high-temperature cracking plant for acetylene production, bringing its total olefin capacity to 50,000 tons/year.

Elsewhere in Europe, petrochemical capacity is not pressing so close to demand as it is in Germany, and so it's not likely that there will be a sharp and abrupt drop in U.S. petrochemical exports to that area. But as of now, the outlook is that the era of every-year increases in U.S. petrochemical shipments to Europe is about at an end.

CW PHOTO

IMC's Tom Ware plans for expansion, diversification, research.

Mapping IMC's Growth

Long-range plans for expanding, diversifying and integrating International Minerals & Chemical Corp. (Chicago) were outlined this week by 39-year-old Tom Ware, who last month succeeded his father as chief executive of the 49-year-old concern.

The problems that IMC will face, Ware points out in an exclusive *CW* interview, are no longer the same as those tackled by his father, Louis Ware, and by his father's predecessors.

"IMC, by virtue of its very growth, has changed," says Ware. "For example, today we're operating in an atmosphere of oversupply and economic downturn, in contrast with the war-boom prosperity that helped boost us over the $100-million sales mark."

New Creativity for Management: These conditions, he says, call for a new creativeness and sophistication in management if they are to be met successfully.

As an example, Ware proposes more emphasis on corporate-level staff departments, giving more responsibility to top staffers by coordinating marketing, engineering, public relations, mining exploration, and the like, for all divisions. IMC, he notes, will strengthen these positions, add others as the company grows.

Ware attributes the success of the company's recently launched "Full Orbit" program (*CW, June 14, p. 57*) to the staff department setup. He points out that the marketing needs of four separate divisions helped forge the single program.

Keen for New Ventures: Corporate staffers can help in diversification and expansion, too, says Ware. He is enthusiastic about getting into new fields, believes the staff organization is essential for evaluating such moves.

With IMC's Ac'cent seasoning already a fast-moving retail item, the company is out to score with other direct-to-the-consumer products. The company is now test-marketing Saucequick (an instant white-sauce preparation) and Thrive (a once-a-year homelawn plant food).

Ware is also planning renewed emphasis on bulk medicinal chemicals for manufacture at the company's plant at San Jose, Calif. These materials—glutamic acid derivatives and betaine compounds—come from by-products turned up in the manufacture of monosodium glutamate.

Fluorine for Rockets: In addition, IMC is seriously considering entry into the high-energy fuels business. Specifically, this move would be through production of fluorine—a by-product of phosphate chemicals—which shows promise as an oxidizer in rocket fuel systems.

Potash Gaining: Plans also call for big growth in fertilizers. Example: IMC's major expansion expenditures for this coming fiscal year are committed to a new $25-million potash mine, due onstream in '60, in Saskatchewan, and to continuing improvements and expansions at the Bonnie phosphate works in Florida. In fact, of all the six IMC divisions, Ware expects the Potash Division to show the largest gains in coming years.

Last year, all six divisions finished well in the black. Listed according to '57 fiscal sales volume, the divisions are Plant Food, Potash, Phosphate Chemicals, Phosphate Minerals, Amino Products, and Industrial Chemicals. And although Industrial Chemicals finished last, says Ware, it will probably be among the leaders in a few years.

Research Means Growth: Looking still farther into the future, Ware believes growth can best be spurred by new research. He enthusiastically supports all phases of IMC's research program. Although the company spent more than $3 million on research last year, Ware declares, "We may never be able to afford as much as I'd like to see going into R&D."

For the coming year, Ware's outlook for IMC is wholly optimistic. With a pickup in agricultural chemical sales apparently on the way, all signs point to another near-record year in 1958-59. And with Ware's plans for aggressive research and diversification, it's likely that earnings highs set in 1956-57 will be eclipsed in the years closely following.

GAF: Back to the Beginning

What happens to General Aniline & Film Corp.—under government administration since 1942 and the subject of court litigation since '48—is a saga that appears to be just getting started again this week.

Despite 10 years of litigation, the fate of GAF is no more certain today than it has been since the day early in World War II when the government seized it as enemy property. That's about what the Supreme Court's decision last week means *(CW Business Newsletter, June 21)*.

The government had hoped it was close to the end of the litigation filed in '48 by the Swiss holding company Interhandel, aimed at recovering GAF stock. If the Supreme Court had upheld the lower courts, Justice Dept. lawyers this week would be preparing the steps to put the $100-million chemical and dye property up for public auction.

Back to Starting Point: As it is, however, all the years of litigation have succeeded only in bringing the case to a point where the trial can begin. Interhandel is actually no closer to winning GAF back—but sale by the government, which seemed so near last year, drops back out of sight again.

The government charges that from the time of its incorporation in '28, Interhandel had been in a conspiracy with I. G. Farbenindustrie, former German chemical cartel that had founded GAF, and with H. Sturzenegger & Cie., Swiss banking firm. Their alleged intent: to "conceal, camouflage, and cloak the ownership, control and domination by I. G. Farben of properties and interests located in countries, including the U.S., other than Germany, in order to avoid seizure and confiscation."

After the war, when Interhandel sought to regain GAF, the government obtained a district court order requiring production of a large number of Sturzenegger banking records, on grounds they were important in showing the true ownership of GAF stock. Interhandel said disclosure of the records would violate Swiss banking laws. When Interhandel came up with only part of the desired papers, the government asked—and ultimately obtained—dismissal of Interhandel's suit for failure to comply.

Back to Trial Court: After circuit court had upheld the dismissal, Interhandel appealed to the Supreme Court, arguing that it had "patiently and diligently" tried to comply with the court order. Last week, speaking for a unanimous court, Justice John Harlan declared that Constitutional "due process" had not been given to Interhandel in dismissing its case before trial. Thus, the case now will go back to Washington, D.C., district court.

As of this week, neither side knows just what will happen next. Reason for this uncertainty is the wide discretion the Supreme Court is giving to the trial judge, Bolitha Laws. Harlan suggests the following alternatives, but doesn't exclude others:

- The district court could give the government additional opportunity to challenge Interhandel's good faith.
- The district court could "explore plans" for more complete disclosure of the banking documents.
- The district court could "commence at once trial on the merits."

In Slow Motion: Interhandel spokesmen told *CW* the words "at once" in Harlan's reference to start of the trial "could not possibly mean anything less than one year."

Neither side is happy at the prospects of more protracted litigation. But a quick trial appears to be out of the question; and other conceivable outs seem about equally remote.

One of these is out-of-court settlement. Interhandel is anxious to try this, but government officials are noncommittal.

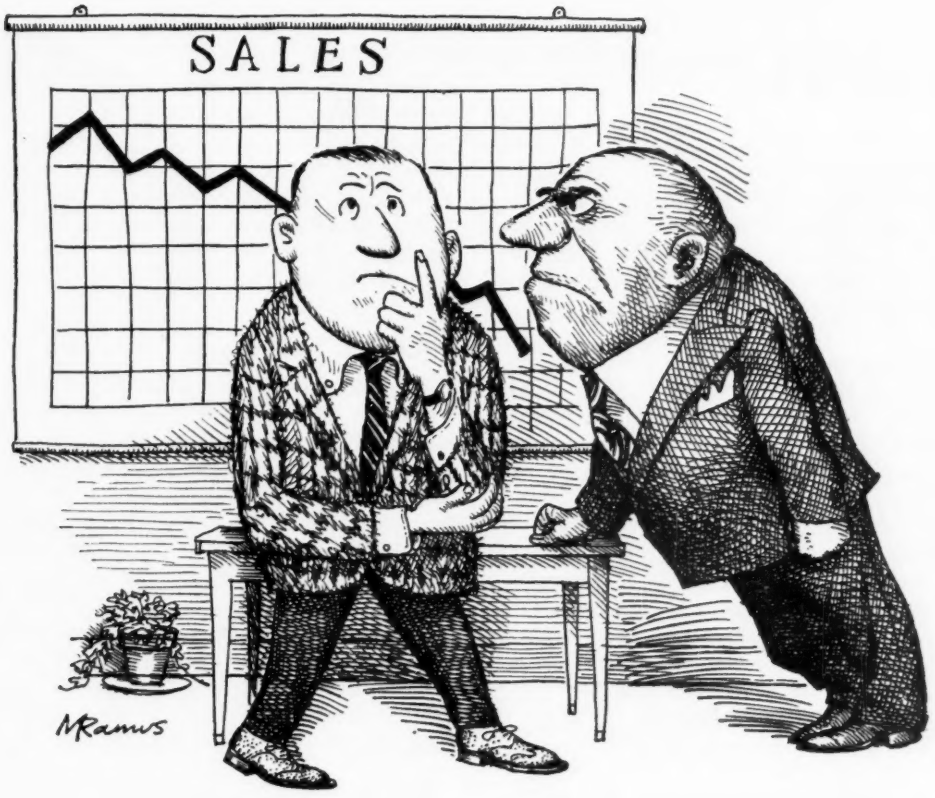
As for Congressional action, this too seems highly doubtful. The government in the past has supported proposals to permit sale of alien property that is tied up in court suits, with proceeds to be held in escrow for former owners who succeed in establishing their claims. This proposal has never received serious attention, however.

The Interhandel suit's new lease on life also seems to eliminate arbitration or negotiation on the case between the Swiss and U. S. governments. Likewise, the Swiss move before the International Court of Justice seems to be sidetracked.

SOVFOTO

Plastics Envoys to Moscow

C. Russell Mahaney, president of Society of the Plastics Industry, and R. E. Burk, Du Pont's associate director of research, watch production of polystyrene film at Russia's Kuskovo chemical plant. They are members of a nine-man U.S. plastics industry delegation visiting Russia under the cultural and technical exchange program established last January. In November, nine Russian scientists will visit the U.S.



The Perfect Solution

(nutritionally speaking)

"Cut out the brainstorming," roared the harassed sales manager to ivy league adman. "*Ruffage* breakfast cereal needs a *real* sales hypo."

Ivy league shrugged. "Okay, no dancing girls . . . *wait!* I've got a new wave length. Have you read about Pfizer *Lysine?* Terrific! It's something called an amino acid. Gives cereal products the high protein quality of meat or eggs. That kind of health bonus could really get *Ruffage* off the launching pad!"

The manager squints. "Boy, I think you may have it. Get Pfizer on the phone."

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

If you are considering amino acid or vitamin fortification of a food product (or, for that matter, if you need a food acidulant, antioxidant or preservative) get in touch with the Pfizer Chemical Sales Division. *For any problem which might be solved by a high quality organic chemical, think of Pfizer first.* Chas. Pfizer & Co., Inc., Chemical Sales Division, 630 Flushing Ave., Brooklyn 6, N. Y.

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COMPANIES

Santa Fe Western Corp. (Albuquerque, N.M.) has acquired Waldrip Engineering Co. (South Gate, Calif.).

Waldrip makes equipment for chemical plants, refineries and other processors and is a fabricator of ground handling support equipment for aircraft and missiles. The Albuquerque firm will operate Waldrip as a wholly owned subsidiary.

•

Wesson Oil and Snowdrift Co. will close down its cotton oil plant in Sheffield, Ala., July 1. Plant Manager Clement Duncan said the decision to close "was brought about by the decline of cotton acreage in the area, due to the cotton program imposed by the federal government."

•

Dayton Rubber Co. has borrowed $11.4 million from Equitable Life Assurance Society of the U.S. through issuance of 4⅝% long-term notes. Part of the proceeds will be used to retire existing long-term notes and to equip a new mechanical rubber goods plant slated to be built on a 62-acre site near Springfield, Mo. The rest will be added to working capital.

The new plant will employ several hundred persons.

•

The Hamme tungsten mine (Henderson, N.C.) may reopen if a proposal by Secretary of Interior Fred Seaton designed to guarantee a tonnage price for tungsten is approved. The mine was to be shut down this week. William Weaver, Hamme president, told a Senate subcommittee that the company may be able to start up again in five or six months if Seaton's proposal is okayed. The North Carolina mine accounts for 30% of U.S. tungsten production.

EXPANSION

Sulfur: Work is under way on an $8-million sulfur extraction project near Calgary, Alta., jointly capitalized by Texas Gulf Sulphur Co. and Devon-Palmer Oils Ltd. Devon-Palmer President Morris Palmer said delivery of about 10 miles of gathering-system pipe has been made to a site on the outskirts of Okotoks.

•

Fiber Glass: Molded Fiber Glass Co. (Ashtabula, O.) will purchase the Ashtabula plant formerly occupied by Inland Container Corp. The unit is expected to be ready by fall. It will house the model and tool shop and the sales and engineering departments of the company.

•

Patching Compound: Humphrey-Wilkinson (North Haven, Conn.) is expanding 30% to increase output of plastic patching material.

•

Chemicals: Dow Chemical Co.'s next major expansion may be in the Ohio River valley. Dow President Leland Doan told the Pittsburgh Society of Financial Analysts that coal has tended to become competitive with gas as a fuel and that the plentiful coal supply in the Ohio Valley is tempting chemical companies that plan to expand. Doan emphasized that though "the going is rough" right now—referring to present business conditions—there will be another era of major expansion after the current dip.

FOREIGN

Nylon/Britain: British Nylon Spinners Ltd., out with its annual report last week, showed a profit of $27 million in '57, $2.5 million higher than in '56. The company also revealed it will spend $8.5 million to expand its Doncaster (Yorkshire) plant, with completion scheduled for sometime in '59. BNS is jointly owned by British rayon manufacturer Courtaulds Ltd. and Imperial Chemical Industries.

•

Glycerine/Netherlands: Europe's first synthetic glycerine plant is onstream at Royal-Dutch-Shell's refinery near Rotterdam. The plant, operating on a continuous basis, is the final section of a group of installations designed to manufacture related industrial chemicals.

•

PVC/Iran: Negotiations between National Iranian Oil Co. and Khuzestan Energy Authority are delaying construction of the Middle East's—and Iran's—first polyvinyl chloride plant. Observers report that NIOC would prefer to start a petrochemical industry in Iran rather than let the Plan Organization, the government's development agency, do so and then turn it over to private interests.

If approved, the project will cost $8 million, will use 1 million cu.ft./day of natural gas piped from the Agha Jari oilfields, east of Ahwaz.

•

Newsprint/Mexico: Mexico's first newsprint mill is now in production with a capacity of 100 metric tons/day. The new mill, located in Oaxaca state 250 miles southeast of Mexico City, will supply half of Mexico's 67,000-ton/year requirements.

The newly formed operating company, to be called Fabricas de Papel Tuxtepec, S.A. de C.V., is jointly capitalized by the Mexican bank, Nacional Financiera S.A., Parsons & Whittemore-Lyddon Organization (New York and London) and George Wise, who is serving as president.

•

Chemicals/Brazil: Farbenfabriken Bayer's Brazilian subsidiary, Bayer do Brasil Industrias Quimicas S.A., has completed a $10-million construction project at its manufacturing complex near Rio de Janeiro. Chemicals to be produced include tar dyestuffs, textile auxiliary agents, bichromate, chromic acid, chromium tannin, pesticides of several types and sulfuric acid.

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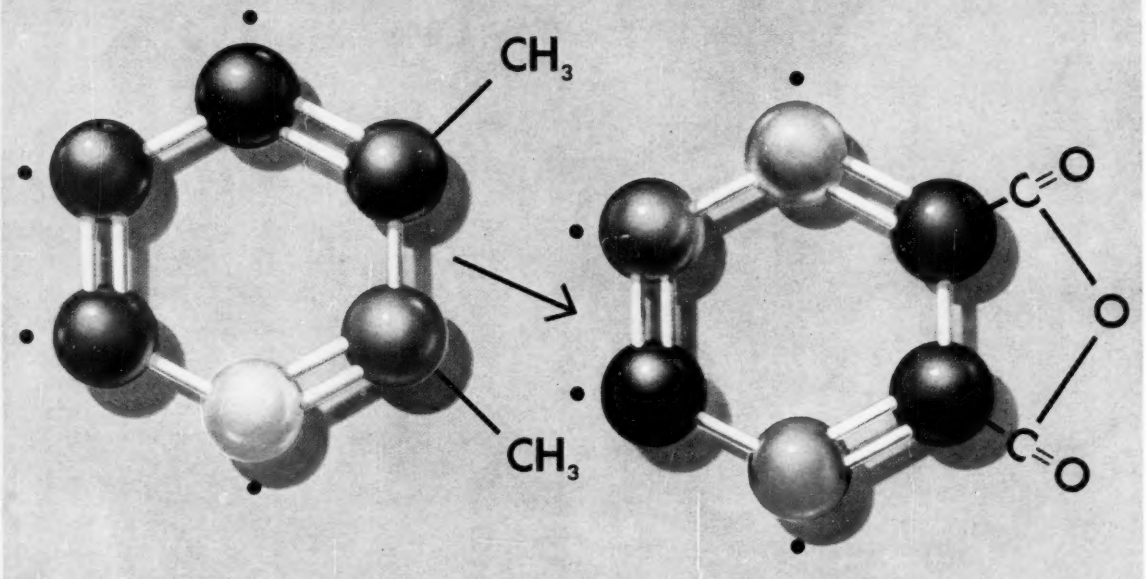

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Washington
Newsletter

CHEMICAL WEEK
June 28, 1958

Proposed price and production supports on minerals will be cleared for Senate debate shortly after the long July 4 weekend. The Senate Interior Subcommittee will seek a compromise between what Interior Secy. Fred Seaton already has offered and what domestic producers want in addition.

Basic purpose behind the program is to keep domestic producers of these metals in business—and an equally important result will be to prop the price of copper at around 27½¢/lb., lead at close to 17¢, zinc at about 14¢.

Meanwhile, custom smelters again edged copper prices upward last week. The hike brought copper up to 26½¢/lb. (*also see Market Newsletter, p. 63*).

Seaton has rejuggled his original proposals to include a stockpile for copper surplus, higher price props for lead and zinc, bigger production bonus payments for beryl, chromite, and columbium-tantalum. (*CW Washington Newsletter, June 21, p. 45.*)

The committee wants to add a surplus stockpile for lead and zinc, and include antimony, cobalt and mercury in the price subsidy plan proposed for lead, zinc, fluorspar and tungsten.

Seaton is bending over backwards to accommodate mining-state congressmen, led by committee chairman James Murray (D., Mont.), hopes to lessen their opposition to the reciprocal trade bill. He is expected to agree to at least some of the committee's additional amendments to his package support plan. Final Congressional approval of the $151 million that the program would cost is another story.

•

A new note of confidence about the business outlook is detected in Washington. No one is going overboard on the rosy side, but the trend indicators—with a few exceptions—seem to be either leveling out or showing a pickup.

The new feeling is that: (1) the end of the business slide is near at hand and (2) the upturn may be sharper and faster than anyone has thought, up to now.

Gabriel Hauge, Eisenhower's top economic advisor, predicts "a great forward movement" in the fall. And there are signs from key business areas indicating some businessmen believe in a fall upturn. A number of appliance manufacturers—among the hardest hit by the recession in the durable goods—are making plans to expand output and take back production workers. A poll of retailers finds half of them predicting that sales this summer will top those of a year ago.

Here are some of the key signs to add to the picture: home-building and construction are on the upturn; personal income has risen

Washington Newsletter

(Continued)

for three months in a row; industrial production moved up in May after a decline of eight straight months; retail sales jumped in April, continued at the same rate in May; and unemployment dropped last month at greater-than-seasonal rates.

If confidence about an upsurge really takes hold, this could do more for the economy than all the government programs, pump-priming and patriotic appeals to buy now.

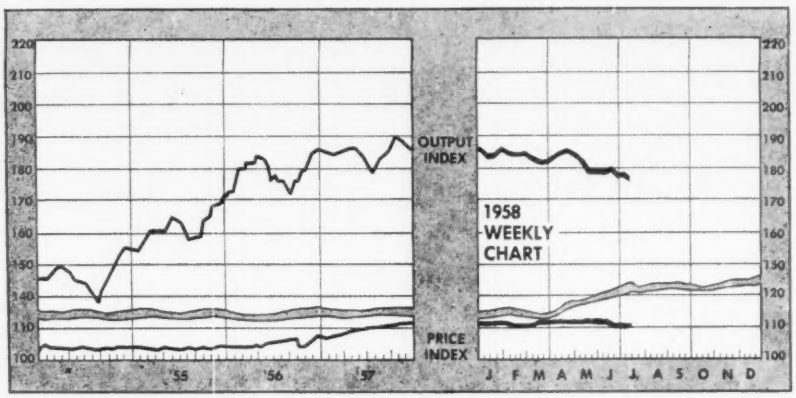
•

Office of Alien Property officials expect General Aniline & Film to continue growing despite the uncertain nature of its future (*see p. 24*).

GAF has experienced tremendous growth since government seizure in 1942. Estimated net worth has gone from about $35 million to over $116 million today. Its '57 sales set an all-time record at $138.4 million, up almost $5 million from those the year before. Its profits rose—but only $500,000 over its $5.1 million in '56.

Additions to plant and equipment will be made again. Last year, something like $13 million worth of additions were put in, bringing fixed assets to almost $71 million.

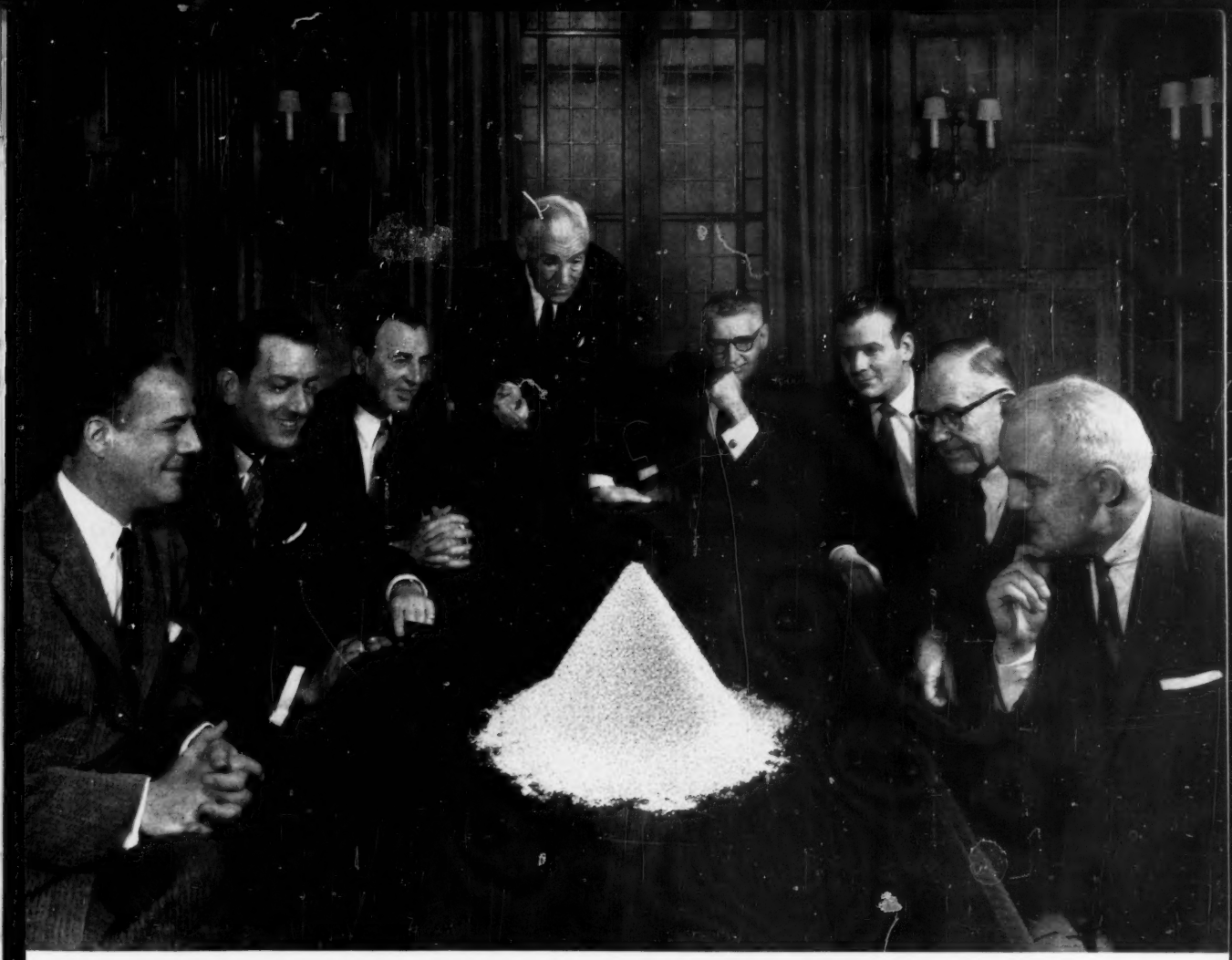
But most observers agree GAF has not been able to realize its full potential in the chemical industry. That's partly because of the peculiar ownership problem—and that handicap seems likely to be around for some time to come.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	176.5	178.0	181.0
Chemical Week wholesale price index (1947=100)	110.6	110.7	110.1
Stock price index of 11 chemical companies (Standard & Poor's Corp).	40.65	39.46	45.82

MONTHLY Wholesale Prices (Index 1947-1949=100)	Latest Month	Preceding Month	Year Ago
All commodities (other than farm and foods)	125.3	125.5	125.2
Chemicals and allied products	110.8	111.0	109.1
Industrial chemicals	123.9	124.3	123.6



NUGGETS... *1958 style*

The modern industrial gold rush lies in the fertilizer field, the fastest growing industry in America. And the production of complex fertilizer has become a veritable bonanza because of the rapid pay-out time on plants of this type. These plants are producing thousands of tons of this revolutionary new fertilizer, both in this country and abroad, for a constantly increasing and permanent market. Only for one brief period during the past 40 years (1930-32) has the consumption of commercial plant food held stable or declined. Only once in 18 years has the consumption of primary nutrients failed to increase. Statistics on the anticipated growth of the U. S. and world populations guarantee this upward trend in the fertilizer market will definitely continue.

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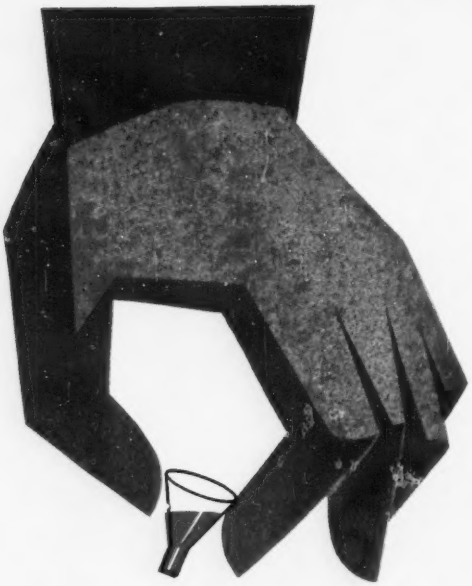

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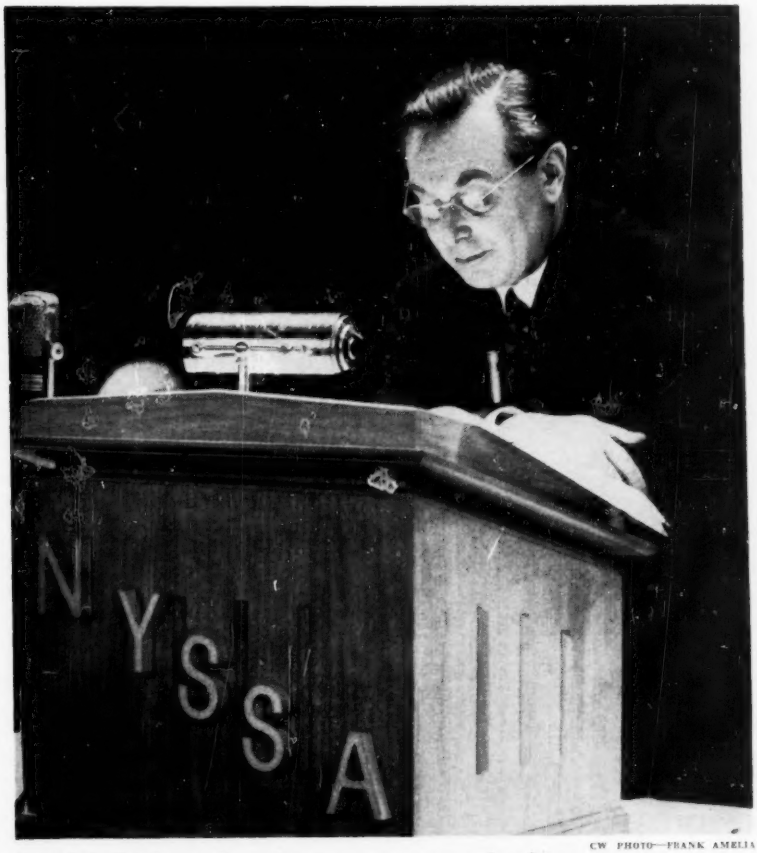

CW PHOTO—FRANK AMELIA

Austria's Teufenstein paints a rosy economic picture as . . .

Austria Makes Its Pitch

U.S. chemical industry executives last week had a gilt-edged invitation to buy into Austria's growing chemical industry; and from the looks of relevant economic indicators (tables, p. 34) such an investment might be wise and profitable.

The invitation comes from Wilfried Platzer, new Austrian ambassador to the U.S., and Wilhelm Teufenstein (*above*), counselor in Austria's Ministry of Finance. Reason for their offer: their country needs long-term investment capital.

In an attempt to bolster Austria's capital market, Teufenstein is currently making the rounds of U.S. banks and private groups, presenting his country's economic picture and negotiating for loans and bond sales.

Platzer recently said that several bond issues are in the "talking stage" for possible fall sale, one to be sold as a direct obligation of the Austrian government, another to be sold by Austrian Electricity Corp., a holding company for power stations.

One Step Under Way: One capital-raising maneuver already under way is the formation of Austrian Investment Credit Corp., established last year to channel borrowed funds into private industry. First sizable amount of money to take this route will be a soon-to-be-released $10.75-million World Bank loan, which will be re-loaned to 11 private corporations in sums ranging from $500,000 to $2 million for 10-18 years.

The credit corporation was set up by Austria's five principal commercial banks; they will later broaden the corporation's capital base through the sale of small shares to Austrian individuals and institutions. The corporation has increased its capital stock, at the World Bank's recommendation, from 1 to 10 million schillings ($384,615); and another $10-million loan is being sought.

Austria's acute need for long-term investment capital stems partly from private companies' inaccessibility to individual savings. Such funds go into savings and loan associations, which in turn deposit them in commercial banks for lending. Thus, up to now, most capital financing in private industry has been through investment of profits or short- or medium-term bank loans.

Growing Chemical Industry: A major beneficiary of Austria's drive for more investment capital will be the chemical industry, largely privately owned. Growing at a rate faster than Austrian industry as a whole, the chemical industry numbers 770 enterprises, 441 of which are of substantial size and employ approximately 40,000 people.

In '57, the industry registered a better-than-10% increase in production value over that of '56. Employment is high, and wages and prices have remained steady for a significant period.

Domestic needs and the lack of domestic raw materials force Austria to import chemicals worth 50% of the value of its total domestic chemical production. Chemical exports amount to 24.5% of production. Austria's chemical exports and its distribution of chemicals on the world market make the country's chemical industry a competitor chiefly to similarly small countries. Sixty percent of Austria's total trade is with West Germany.

Free-Trade Area: Austria's decision to participate in the proposed European Free-Trade Area (but not the Common Market) might serve as an additional incentive for U.S. chemical management to invest. Establishing branch plants in Austria would give ready access to the free-trade area, thus saving tariffs, taxes, transportation costs and labor costs. It is on this particular incentive that Austria bases part of its hopes for the future.

Part of Austrian industry and most of the power, communication and transportation facilities are nationalized and controlled by government-held corporations, but the chemicals,

Austrian Chemical Production

(thousand short tons)	1956	1957
Basic chemicals	406.9	422.0
Paints, dyes, tanning materials	38.4	39.4
Soaps, detergents, cosmetics	60.6	63.2
Drugs (million $)	$13.1	$14.0
Plastics	19.7	26.2
Staple fibers	46.8	51.1
Fertilizers	728.4	864.3
All chemicals (million $)	$266	$269.2

Source: Assn. of the Austrian Chemical Industry.

paper and textile industries are mostly privately owned. The country's stable two-party coalition government has stated repeatedly that further nationalization is not envisaged. In addition, officials point out, transferability of foreign funds is possible, and Austrian currency is 90% covered by gold and foreign currency.

Speaking recently before New York Society of Security Analysts, Teufenstein cited the need for outside help to meet long-term capital requirements, said it was his government's general policy to encourage individual and corporate investors. "We have a most positive attitude toward the U.S.," he said.

Chemical Imports from U.S. in '57

	Value (thousand dollars)	Volume (short tons)
Basic chemicals	659.8	3,953
Paints, dyes, tanning material	221.9	802
Soaps, detergents, cosmetics	146.1	417
Pharmaceuticals	529.8	1,515
All chemicals	4,628.4	16,661

Source: Austrian government.

Planning ahead can save $20,000 on fluid mixing

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ADMINISTRATION

LABOR

Paper Contract: Union members at nine plants of International Paper Co.'s Southern Kraft Division have accepted terms of a new contract. The contract reportedly calls for a 3% general wage increase for about 12,000 employees. They're members of United Papermakers and Paperworkers (International Brotherhood of Pulp, Sulphite and Papermill Workers) and International Brotherhood of Electrical Workers.

According to local observers, the contract that's signed with International Paper usually is a pattern for papermakers in the South. The papermakers union has 55,000 workers in 11 Southern states. Though details of contract terms were not revealed, the pact reportedly did not contain a guaranteed annual wage—a goal set by Southern Assn. of Pulp and Paper Unions last April.

LEGAL

Price Fixing: With or without "fair trade" laws, manufacturers will be able to fix resale prices, if last week's dismissal of charges against Parke, Davis & Co. remains standing, say antitrust men in the U.S. Dept of Justice. A federal district court in Washington, D. C., granted a defense motion to dismiss the civil antitrust charges of conspiracy to fix prices brought against the company some time ago. A similar criminal suit wound up in acquittal of the company last November.

The charges alleged that P,D had conspired to fix prices on its products in Washington and Virginia and to boycott retailers who failed to adhere to the company's suggested retail prices. Judge Joseph R. Jackson said the government failed to prove the existence of conspiracy.

Government attorneys fear that if the Supreme Court upholds the lower court in an appeal—which has been recommended as the next government move—manufacturers would have no fear of boycotting retailers on an individual basis to force acceptance of suggested prices.

Government attorneys assert the dismissals are based on a misapplication of a 1919 Supreme Court decision dealing with a manufacturer's right to choose his customers. Five wholesalers were listed as P,D's alleged co-conspirators.

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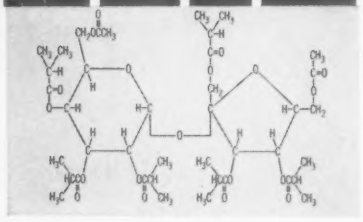
This is the formula for

SAIB



This is the structure of

SAIB

This is how Eastman sells

SAIB

100% SAIB
SAIB

90% SAIB IN ETHYL ALCOHOL
SAIB-90

For more information see opposite page

Unique Sugar Derivative...Offered in Commercial Quantities

SUCROSE ACETATE ISOBUTYRATE

New resin extender offers outstanding thermal and hydrolysis stability, wide compatibility, low volatility...for lacquers, hot melts and peelable coatings

Here is a new chemical product, Sucrose Acetate Isobutyrate (SAIB), so unlike any known product that its performance characteristics are difficult to classify. Generally, however, they lie between those of a plasticizer and a resin.

Heavy, Compact Molecule

SAIB is made by esterification of sucrose with acetic anhydride and isobutyric anhydride. The result is a clear, extremely viscous liquid of high molecular weight (847). In fact, SAIB is believed to be the heaviest organic monomeric molecule available on a commercial scale. Despite its high molecular weight, SAIB has a singularly compact molecular structure.

Figure 1

Good Permanence

This compactness accounts for SAIB's outstanding stability to heat and water. For example, after six days at 350°F, SAIB shows a change in Gardner color from 3 to only 10. Hydrolysis, after refluxing in water for 4 days, amounted to less than 0.35%. With a boiling point above 550°F, fuming of SAIB is virtually non-existent at melt temperatures in the neighborhood of 350°F.

Viscous, Soluble, Compatible

The viscosity of SAIB is so high at room temperature, its characteristics approach those of a semi-solid (100,000 centipoises at 30°C). Viscosity changes rapidly with temperature, however, dropping to 4,800 centipoises at 50°C and to 90 centipoises at 100°C. The extreme solubility of SAIB is indicated by the low viscosity (750 centipoises at room temperature) of 90 parts SAIB dissolved in only 10 parts of ethyl alcohol. *(See Figure 1)* It is in this 90% SAIB-10% ethyl alcohol solution, as well as in the 100% concentrate, that Eastman markets SAIB. In addition to good solubility, SAIB is compatible with a broad range of resins, plasticizers, oils and waxes.

Solvent Coatings

In solvent coating formulations SAIB serves to extend solids content without significantly affecting the ultimate physical properties of the film. For example, the solids content of a lacquer system based on ½ sec. RS nitrocellulose can be increased from 20% to 33% by replacing half the nitrocellulose with SAIB, without affecting film hardness or viscosity. Thus, greater surface area coverage per gallon of lacquer can be achieved with reduced solvent requirements. In addition, an improvement in adhesion has been noted.

Hot Melts, Peelable Coatings

Tough, flexible melt coatings can be prepared containing up to 70% SAIB. Properly formulated, such coatings have excellent color stability and exhibit good adhesion, gloss and scuff resistance on paper and cloth. They are also characterized by an absence of fuming at melt temperatures.

Peelable plastic coatings containing high percentages of SAIB are highly resistant to exudation and retain their flexibility. *(See Figure 2)*

Figure 2

As a new and unique chemical compound, SAIB is being evaluated by Eastman's Customer Service Laboratories for many industrial applications. A newly published bulletin on this sucrose ester is available. It contains typical formulations for a variety of solvent and melt-type coatings, as well as a description of SAIB's unusual physical properties and performance characteristics. For your copy and for a sample of SAIB, write to Chemical Sales Development Department, Chemicals Division, Eastman Chemical Products, Inc., Kingsport, Tennessee.

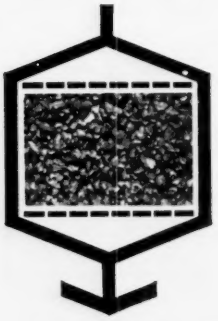
SAIB

SUCROSE ACETATE ISOBUTYRATE

Eastman CHEMICAL PRODUCTS, INC., KINGSPORT, TENNESSEE, subsidiary of Eastman Kodak Company

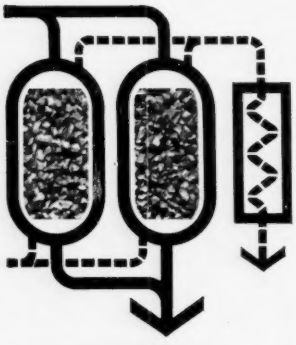
ACTIVATED CARBON

purifies liquids and gases; eliminates tastes, odors, chlorine, and a wide range of contaminants from liquids and solutions. Decolorizes and deodorizes liquids. Raises the standards of purity for many industrial gases. Removes undesirable impurities. Permits recovery, re-use, or resale of by-product gases. Effective for difficult gas separations. Save on heating and cooling by recirculating air through activated carbon filters. Improve comfort and safety in living and working spaces.



ACTIVATED CARBON

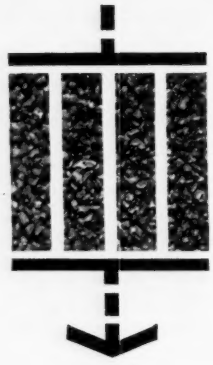
recovers solvents at a fraction of the original cost. Activated carbon adsorbs solvents from air. Helps improve products by making the best solvents economical to use. We engineer and build complete solvent recovery systems in addition to supplying bulk activated carbon. Stops pollution, removes contaminants from exhaust air or liquid effluent. Recovers by-products.



ACTIVATED CARBON

catalyzes and serves as a catalyst support. Speeds oxidation-reduction reactions, chlorinations, and hydrogenations—the key to vinyl chloride production. We supply all grades of activated carbons made to strict quality standards and provide prompt regeneration service. Barnebey-Cheney, Columbus 19, Ohio.

Write for Literature Group J-46.



Barnebey Cheney

ADMINISTRATION

KEY CHANGES

Charles F. Harrison to controller, Pitman-Moore Co., division of Allied Laboratories (Indianapolis).

Hans O. Kauffmann to director of research and development, Inorganic Chemicals Dept.; and **Oscar H. Johnson** to director of research and development, Organic Chemicals Dept.; Chemical Divisions, Food Machinery and Chemical Corp. (New York).

Rene A. Bolomey to manager, newly formed Chemistry Dept., Nuclear Development Corp. of America (White Plains, N.Y.).

Eugene J. Sullivan to executive vice-president, Borden Chemical Co.

Daniel B. Witwer to vice-president, Polyvinyl Chemicals, Inc. (Peabody, Mass.).

Allen F. Owen to vice-president, Latex Fiber Industries (Beaver Falls, N.Y.).

William C. Lytle to vice-president in charge of Explosives Division, Atlas Powder Co. (Wilmington).

Robert S. Ives to director of research, Ludlow Papers, Inc. (Needham Heights, Mass.).

Thomas L. Hammond to board chairman, Whiting Corp. (Harvey, Ill.).

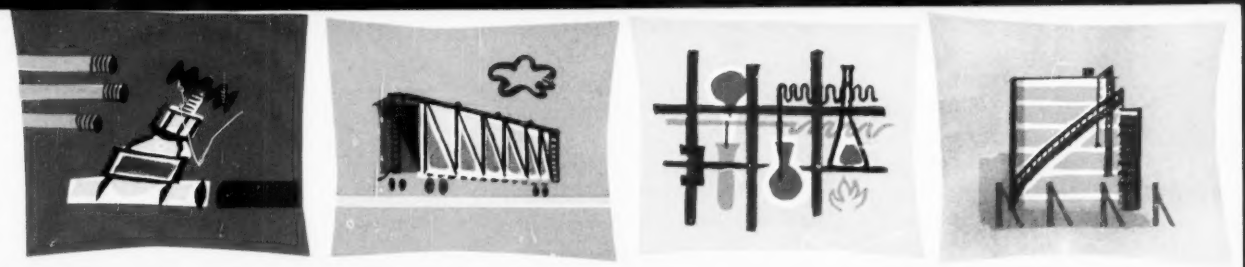
Robert L. Terrill to director of research and development and vice-president, Spencer Kellogg and Sons (Buffalo, N.Y.).

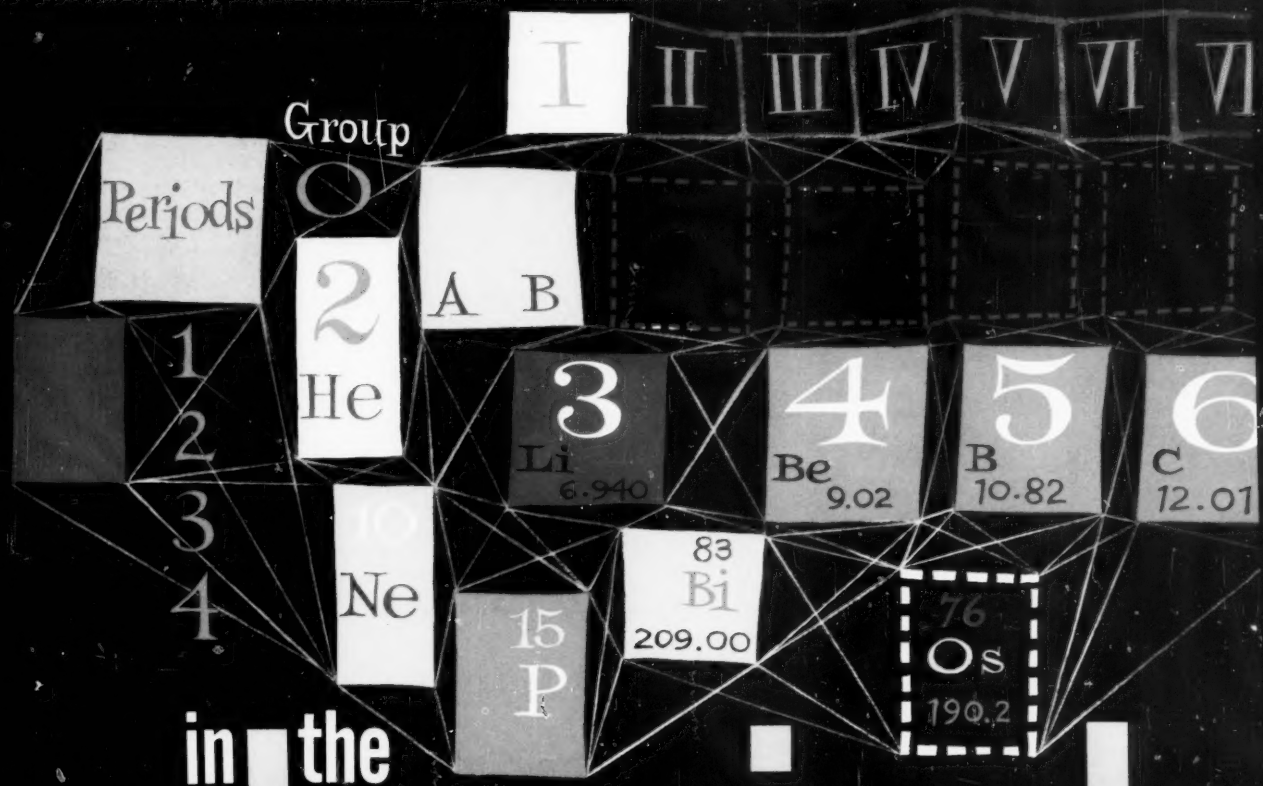
A. E. Edwards to director of research, Aluminium Laboratories Ltd. (Montreal), subsidiary of Aluminium Ltd.

Leslie A. Miller to senior vice-president for operations, **Marcus Evans** to vice-president for alloys, **Ralph E. Merryman** to vice-president for chemicals and building materials, **Robert W. Romer** to controller and **Howard F. Reeves, Jr.,** to assistant vice-president for research and development; Tennessee Products & Chemical Corp. (Nashville), subsidiary of Merritt-Chapman & Scott Corp.

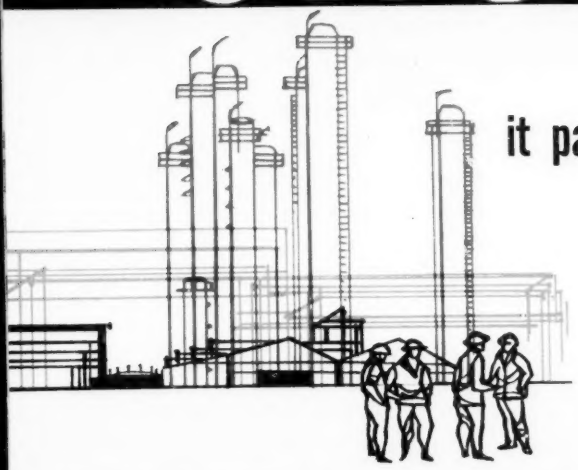
ASSOCIATIONS

Chauncey Starr, vice-president, North American Aviation, to president, American Nuclear Society.





in the chemical industry

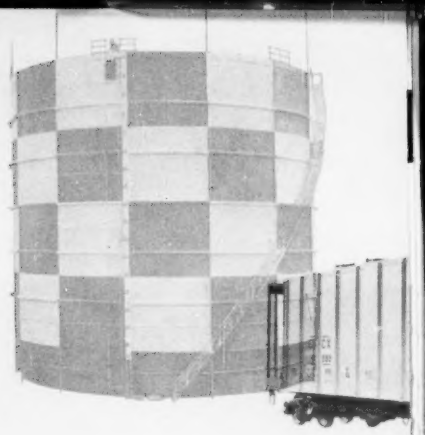


it pays to plan with GENERAL AMERICAN

New use for a gasholder—cost savings on bulk shipments of dry chemicals—heated tank cars—a "rubber barrel" for hydrochloric acid . . . these are some of the ways General American helps solve problems in transportation, production and marketing for the chemical industry.

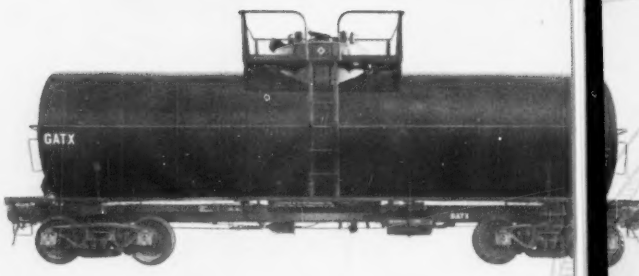
"STOCKROOM" FOR LINDE ACETYLENE

When the new acetylene plant of Linde Company, division of Union Carbide Corporation, went "on stream" at Montague, Michigan, a new 100,000 cubic foot Wiggins Dry-Seal Gasholder played a vital operating role. Acetylene passes through this "stockroom" on its way to DuPont for use in the production of neoprene. The gasholder provides acetylene storage and serves as surge capacity when there are emergency requirements. The Wiggins Dry-Seal Gasholder, first system to get away from the "bell jar" type with seals of water, tar or grease, can be built to any capacity from 50 to five million cubic feet.



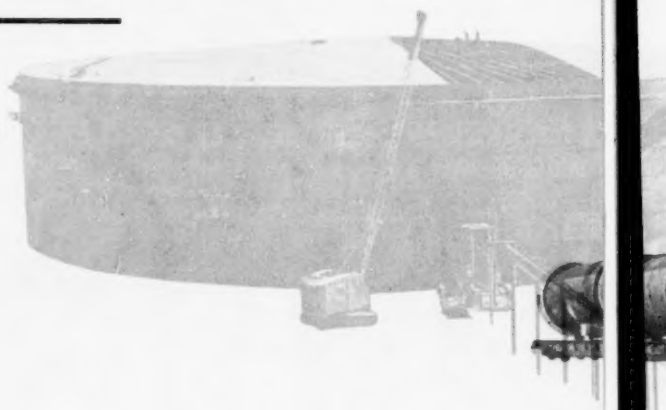
NaOH SHIPPED BEST IN GATX INSULATED TANK CARS

How can you ship caustic soda in all weathers, when freezing (at 40° F.) can be disastrous? That question has been answered by General American with tank cars that carry 6 inches of insulation around the tank plus General American's exclusive half-oval heater coils. In addition, there's special insulation around anchorage and bolster areas. Protection of these shipments is typical of General American's work in many fields. If you ship liquids in bulk there's a General American tank car built (or that can be built) to your needs.



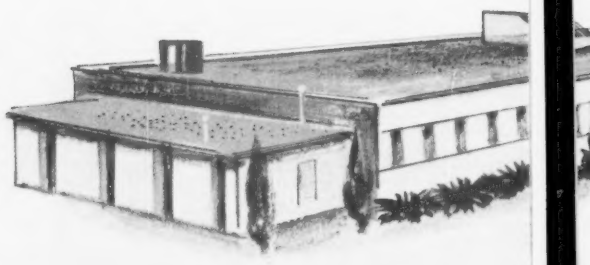
HOLDS AS MUCH AMMONIA AS 770 TANK CARS

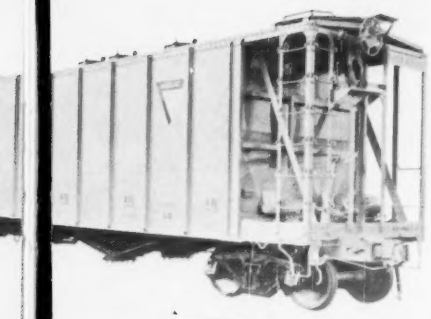
You could discharge the loaded capacity of a train of tank cars more than seven and a half miles long into Phillips Chemical Company's huge aqua-ammonia storage tank at Cactus, Texas. 220 feet in diameter and 48 feet high, this tank is one of the largest ever built for liquid storage. Liquid is pumped in at a rate of 250 gallons a minute for 37 days before the tank is filled. Phillips' new tank was engineered, fabricated and site-erected by General American. General American has fabricating plants, skilled crews and modern erection equipment throughout the country to facilitate construction of storage structures.



TEST DRY YOUR MATERIALS WITHOUT CHARGE

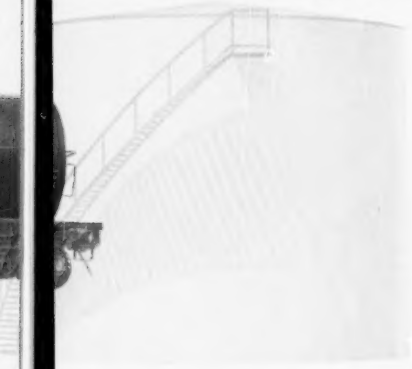
At General American's East Chicago pilot plant, you can test the drying and reaction of your materials in the widest range of drying equipment ever assembled. Louisville engineers will work with you—study your materials and needs, make recommendations for type of equipment, size and heating medium. You can check these recommendations for yourself through practical tests. See how your product reacts in continuous atmospheric rotaries, fluidized bed dryers, solvent strippers, vacuum dryers. When you decide on a Louisville Dryer, it is built to provide efficient and economical service for years.





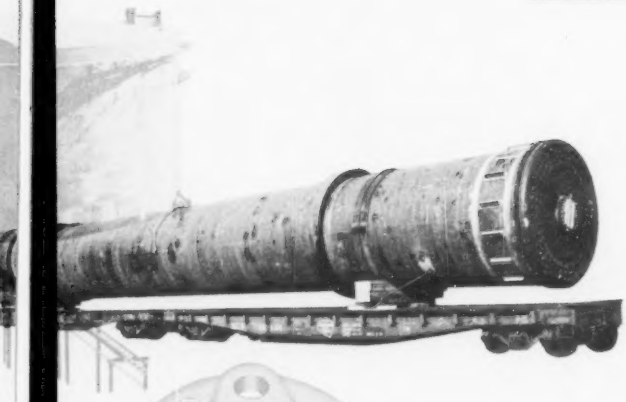
FOR BAKELITE®—A NEW COST-SAVING METHOD

Union Carbide Corporation's Bakelite Division has been making interplant bulk shipments in hopper cars for years. In 1955 Bakelite supplemented this type of transport with 15 AIRSLIDE® cars. Bulk shipments of resins in AIRSLIDE cars provide savings, deliver products free of contamination. Bakelite found there were savings on related costs, too. So successful were the AIRSLIDE cars that within a year Bakelite followed up with an order for 25 additional cars. To learn more about this method of transportation, please use the information card.



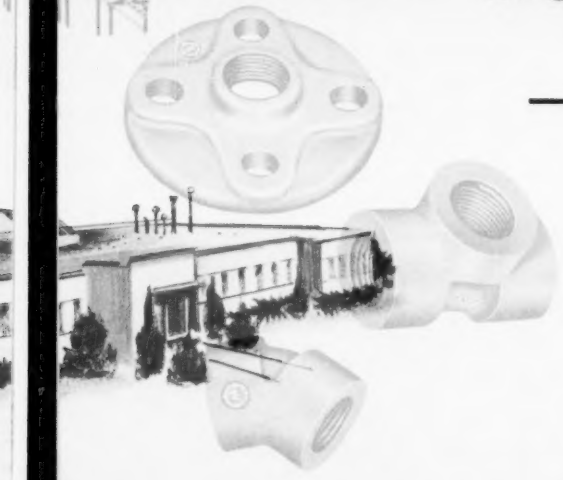
420,000 GALLON "RUBBER BARREL" FOR HYDROCHLORIC ACID

Dow Chemical posed a problem. "How can we store 10,000 bbls. of hydrochloric acid without corroding the tank or contaminating the acid?" Terminal engineers from General American and Dow came up with the answer—a specially-constructed 10,000 bbl. rubber-lined tank with rubber-lined pipes and CARBATE® pumps. 37% acid is brought to the terminal in 5,000 bbl. lots. It is stored pending distribution in tank car quantities. For more dilute solutions, water is metered to reduce the acid to the required concentration. This operation is typical of General American's specialized services in handling "difficult" liquids. To find out how we would approach your problem, please use the information card.



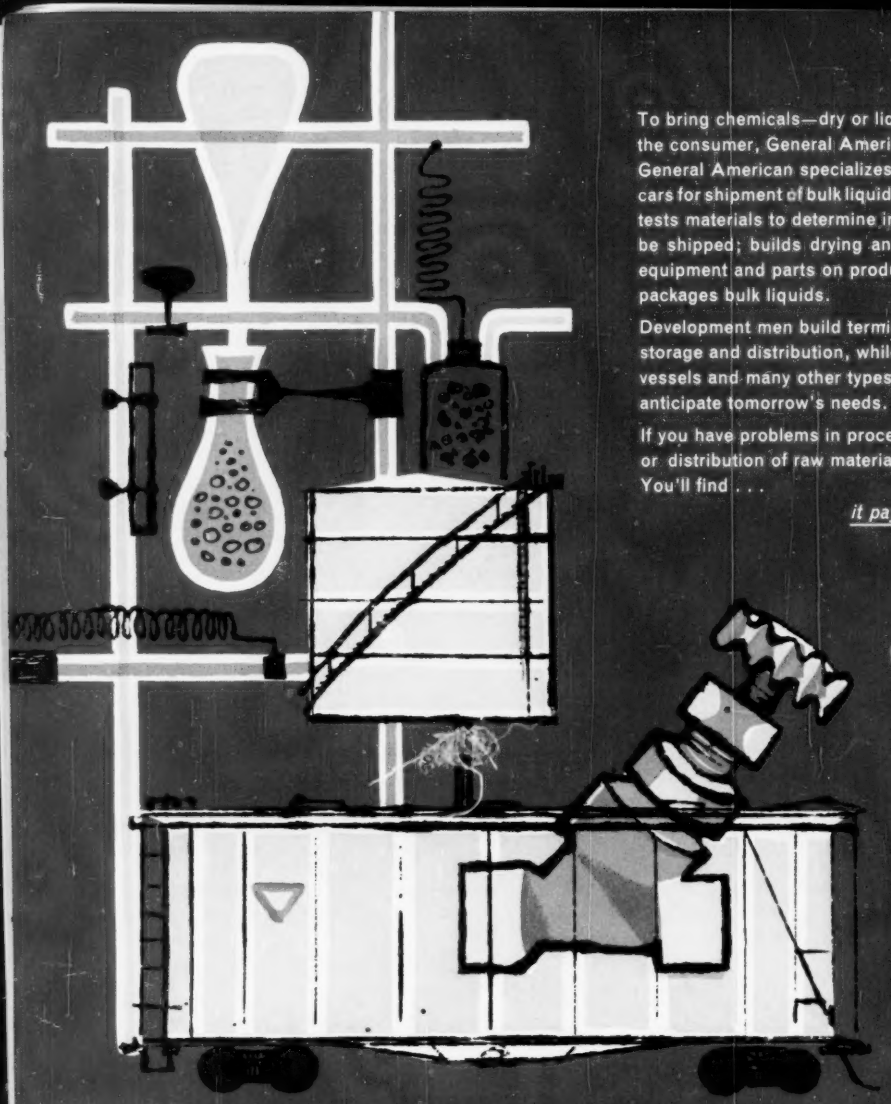
WHEN A NICKEL SURFACE IS NEEDED

You can't economically nickel-plate a dryer 100 feet long—but you can line it with KANIGEN® coating. Wherever you need the protection of nickel, you can use this hard, uniform, chemically-deposited nickel alloy coating that gives low cost metals a hard, resistant surface equal to or better than expensive alloys, solid metals or clad materials at a fraction of the cost. Tank cars lined with KANIGEN are used by General American wherever a nickel surface is indicated. Your equipment or parts—even to a small relief valve—can be barrel-coated, rack-coated or jig-coated at plants in East Chicago, Indiana; Sharon, Pennsylvania; and Compton, California.



PVC PIPE FITTINGS AND VALVES

Walworth Company markets a full line of chemical-resistant polyvinyl chloride pipe fittings and valves which are corrosion resistant, heat resistant and able to withstand high pressures. Choice of General American by Walworth to mold these was no accident. Precise molding of intricate valve parts and threads can spell the difference between a tight connection and a possibly disastrous leakage. Because of General American's system of rigid quality controls, Walworth knows that parts molded by General American will match specifications. Through General American's research and development department, Walworth is assured the benefit of latest techniques and materials available.



To bring chemicals—dry or liquid—in all their varieties to the consumer, General American works directly with producers. General American specializes in the design of new types of cars for shipment of bulk liquids and dry powders. General American tests materials to determine in what type car they can best be shipped; builds drying and conveying systems, protects equipment and parts on production lines, stores and packages bulk liquids.

Development men build terminals to solve the problems of storage and distribution, while technical experts engineer pressure vessels and many other types of production equipment to anticipate tomorrow's needs.

If you have problems in processing, shipping, storage or distribution of raw materials or finished products, call us. You'll find . . .

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Gentlemen:

Please send detailed information about the following General American Services:

- ☐ Leased facilities at General American Tank Storage Terminals
- ☐ Drying and mixing equipment
- ☐ Custom-built Tank Cars for Special Purposes
- ☐ Plastic pipe, valves and fittings
- ☐ Airslide® cars for bulk shipment of dry materials
- ☐ Gas Conservation Structures and Gas Handling Equipment
- ☐ Kanigen® Coating
- ☐ Custom fabrication and full erection
- ☐ Please have a General American Engineer call for an appointment.

M-P's sales vice-president, Earl Lenz (with papers), and top line* of company's new gum division.

Changing the Lineup in Natural Gums

This week Morningstar-Paisley, Inc. (New York), manufacturer of starches, water-soluble gums and liquid adhesives, will make its sixth major acquisition since 1956.† The company is bringing into its fast-multiplying fold the 105-year-old natural gum and vanilla bean supplier, New York-based Thurston & Braidich.

The newly acquired company will become a division of M-P, will retain its name and operate with its present management virtually intact. Manufacturing will move to M-P's plant at Hawthorne, N.J.; Thurston & Braidich executives will move their desks from downtown Manhattan to Morningstar's midtown headquarters.

The addition of T&B will put Morningstar more firmly into the natural gum business, an activity the company first entered in '52 when it acquired the gum department of Innis Speiden Division of International Minerals. At present, the sale of water-soluble gums and related products accounts for about 25% of M-P's annual income of $22 million. The rest of its revenue comes from adhesives (about 55%) and raw and converted starches.

Acquiring Thurston & Braidich probably didn't involve the transfer of much cash from M-P's coffers, the trade speculates, citing the little physical property involved in the acquisition and noting that the partners of the acquired firm, Eusebio Vina and Charles Rosevear Jr., will stay with the company's operations. There's this, too: while Thurston & Braidich is said to have shown a somewhat unexciting sales record recently, Morningstar-Paisley has built steadily increasing sales. From a mark of $9 million in '51, M-P's sales climbed to $21.8 million in '57. And this year should show a still higher figure—for the first quarter of '58, sales were $5.2 million, compared with $4.9 million for the same period in '57.

The development of starch-gum combinations, the economically healthy state of the packaging and food fields, and the growth of wash-and-wear materials makers—all outlets for M-P's products—appear to indicate that the company has bright prospects indeed.

*Flanking Lenz are Eusebio B. Vina *(left)* and Charles Rosevear Jr. *(far right)*, partners in Thurston & Braidich. At Lenz's left is E. T. O'Grady, manager of M-P's Gum Dept.

†The other five: Woerz Paste & Gum Co. (Los Angeles); Dilco Products Inc. (Redwood City, Calif.); Los Angeles Paste Co. (Los Angeles); Federal Adhesives Corp. (New York); and Haberland Mfg. Co. (Clifton, N. J.).

P & G Adds One

Procter & Gamble is now introducing its entry in the field of liquid light-duty detergents. The new product, Ivory Liquid, has the pearly white appearance of the well-known Ivory bar soap. It's more viscous than similar products now on the market, has an odor similar to that of Ivory Soap. The product will be distributed initially to about half the country

Like one clothier more than any other?

CHANCES ARE, you *do* have a favorite clothier. You have confidence in his ability to fit you exactly, and you know he'll treat you with special care after the sale.

Confidence has a lot to do with why people buy chlorine from Wyandotte — confidence in the quality of the product, and confidence in the sincere, deep-rooted technical service that is an integral part of the Wyandotte operation.

Frankly, Wyandotte chlorine is pampered every step of the way.

It is rigidly controlled from basic raw materials to finished product delivered to your plant. And we back it with the highest caliber technical service.

For these reasons, *we guarantee your satisfaction with Wyandotte chlorine.*

You see, we take as much pride in satisfying our customers as a custom tailor takes in satisfying his. Why not write us about *your* chlorine needs today? *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

Wyandotte CHEMICALS

MICHIGAN ALKALI DIVISION

For guaranteed satisfaction, buy Wyandotte Chlorine

in 12-, 22- and 32-oz. blue and white cans.

Ivory Liquid will compete with such light-duty products as Lever's Liquid Lux, Colgate's Vel Liquid, Purex's Trend and Babbitt's Glim. Its price will probably be about 2¢ higher than competing small-size products, about 3¢ more for the large size.

Dewey Goes for Three

Bradley Dewey, 70-year-old founder of two successful chemical process companies, is back in business again. The veteran chemical executive has just created another new company — Hampshire Chemical Corp. (Nashua, N. H.).

Dewey, founder of Dewey & Almy Co. (which was later purchased by W. R. Grace) and also the founder of Bradley Container Corp. (sold two years ago to American Can Co.) will serve as board chairman of the new firm.

The company will make and research chemical specialties, including nickel and copper stripping compounds, washing compound additives, slimicides, and certain synthetic amino acids.

Production will get under way soon in an almost-completed plant near Nashua. Hampshire executives report they've purchased all-new equipment, have modern research facilities and ample space for expansion. Scheduled opening is for late next week.

To kick off its initial sales campaign, the company has hired eight college chemistry students for the summer—to supplement the sales staff. The students will help sell Hampshire's nickel stripping compounds in a nationwide sales effort.

The company is expected to benefit from Dewey's wide experience in the chemical field. Besides his former interest in Dewey & Almy and Bradley Container, he is past president of American Chemical Society and had government service as national rubber director during World War II.

New president of the firm is John Singer. Singer, in his mid-30s, is former chief executive of United Chemical Corp. of New England (Providence, R. I.).

In other top posts: Mark Weisberg, research vice-president, and Alfred Lawrence, vice-president, sales.

HOW THE SILICONES MAN HELPED...

TAKE THE RUB OUT OF RUBBER SEALING STRIPS

Weatherstrip rubber around doors, windows, trunk and hood, should seal, not squeal. Lubricants have been tried, only to be found lacking in many respects. Then the Silicones Man suggested a new kind of silicone lubricant. Now there's no need for squeak in any of the new cars.

Developed for the Ford Motor Company, the silicone lubricant for rubber gives just the right slip between rubber and metal, eliminating squeaky, torn and broken sealing strips. This new lubricant resists rain and water, is greaseless, and gives minimum interference with "touch-up" painting. Originally designed for assembly line application, this new lubricant is available nationwide at new car dealers for service use.

This is another example of how the UNION CARBIDE Silicones Man helped solve an "impossible" problem. A booklet, "Let the Silicones Man Help Solve Your Problems" describes many of the unique silicone products and their applications. Write today for your copy. Dept. FC-4704, Silicones Division, Union Carbide Corporation, 30 East 42nd Street, New York 17, New York. *(In Canada:* Bakelite Company, Division of Union Carbide Canada Limited, Toronto 7, Ontario)

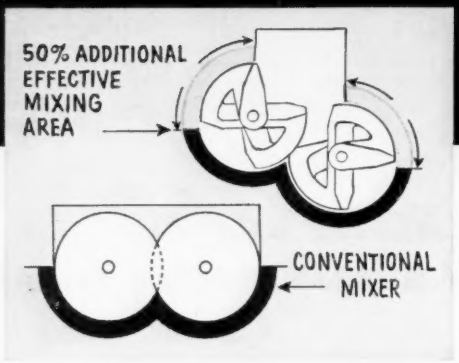
Unlocking the secrets of silicones

Rubber, Monomers, Resins, Oils and Emulsions

UNION CARBIDE TRADE-MARK SILICONES

The term "Union Carbide" is a registered trade-mark of UCC.

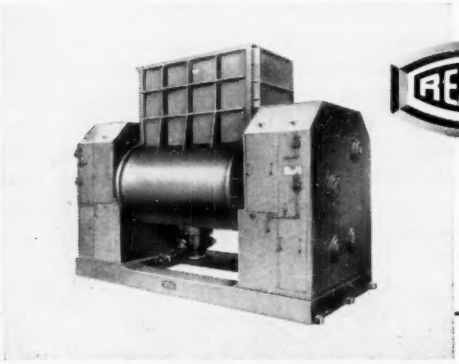
take this unique design... PRESTO! a much faster mix!



with Readco's unique split-level bowl: complete dispersion, shorter cycle, lower cost

The special design of this Readco mixing bowl provides a 50% greater effective mixing area. Overlapping sigma arms operate at minimum clearance from the shell, prevent build-up of materials, speed dispersion. The design also permits maximum heat transfer from the jacket.

You'll get complete dispersion, consistent mixing, in substantially shorter cycles. Working capacities range from 150 to 900 gallons. Write for complete information.



READCO

Whatever the mixing job: a READCO mixer!

READ STANDARD

York, Pennsylvania

A Division of Capitol Products Corporation

Coordinating board at Dow's Midland Division, aiming at reducing expenses, has discovered that . . .

Soft-Sell Spurs Production Cost-Cutting

Cost-cutting gets almost automatic interest these days, and it's the prime concern of the Dow Chemical management group pictured above. But there's a twist to this cost-cutting session—this week these men are putting finishing touches on a plan to soft-sell their program.

Aim: to make cost-cutting a permanent part of the Midland Division operation, rather than an emergency measure.

Within the next few months, all departments of the huge Midland plant will have received training in the novel cost-reduction techniques and completed the first phase of the program. Whether it remains permanently effective depends largely on success of the soft-sell campaign. As coordinating board of the program, the group's members—from production, plant engineering, power and service supervision—are charged with maintaining interest at a high level.

Endorsed—Not Forced: To ensure continued acceptance of its plan, the Midland coordinating board is continuing the "easy" approach that established the program. "And, a lot of the program's success so far is a result of not giving it too much credit," says William Schuette, manager of the division.

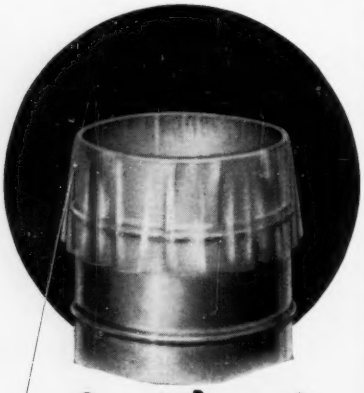
"Management has endorsed the program, but has not forced it," he notes. "We want the plant departments to use it to assist in attacking rising costs and narrowing profit margins, but we do not intend it to be a dominating way of life. Each department is responsible for running its program, placing emphasis it feels is required."

With this approach, it has taken 3½ years for the program to ease its way into all sections of the 9,000-employee plant. And in all that time, the program still hasn't acquired an official title.

Savings Without Fanfare: The techniques follow the philosophy of consultant Allan Mogensen's work simplification (*CW, Aug. 24, '57, p. 74*) —select the job, get all the facts, analyze and challenge each step, develop alternate solutions, install the best one. This approach is so simple that many employees feel it is nothing more than what they've been doing all along. Thus, the soft-sell hasn't antagonized anyone, gets cooperation and results.

Division management has been pleased with results so far, but part of the soft-sell plan has been to de-emphasize dollar savings. Already, however, annual savings are at the million-dollar mark, with only five departments having been trained. Aside from the basic idea of underplaying the program's accomplishments, there are two reasons for the restrained enthusiasm:

(1) Those not familiar with work



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Typical Projects Show . . .

Increased Output: Increased demand for product apparently required either outside purchase of product, additional production facilities or improvement of existing facilities. A work-simplification study showed that a change in still operations could double capacity of the existing plant. And, several process steps could be combined, others shortened, some eliminated. Savings: $55,680/year, with no cost for making changes.

Safety: Moving nitrogen cylinders into position for pressure-priming of a pump for tank-car unloading of flammable liquid required considerable manual labor, created a safety hazard. A $1,400 nitrogen line was proposed. But a work-simplification study resulted in a new unloading method that eliminated nitrogen use, uncovered five additional safety hazards, which were corrected. Added cost: about $500.

simplification might think the savings show only that operations were poor in the first place. And, further, these results are only average when compared with results from other firms, whose operations have been thrown open to the critical work-simplification analysis. For example, at Du Pont's Chambers Works, the Organic Chemicals Division reported a $4-million savings as a result of one work-simplification campaign.

(2) Adoption of program-stimulated ideas doesn't always chalk up savings. Many ideas are accepted because they will improve product quality, plant safety, working conditions or department relations. And Midland Division management doesn't want these forgotten or disregarded in a pell-mell dash for big savings. In fact, ideas that don't produce direct savings may become one of the most important advantages of the program in the future, as one proposed title for the program—"operations improvement"—suggests.

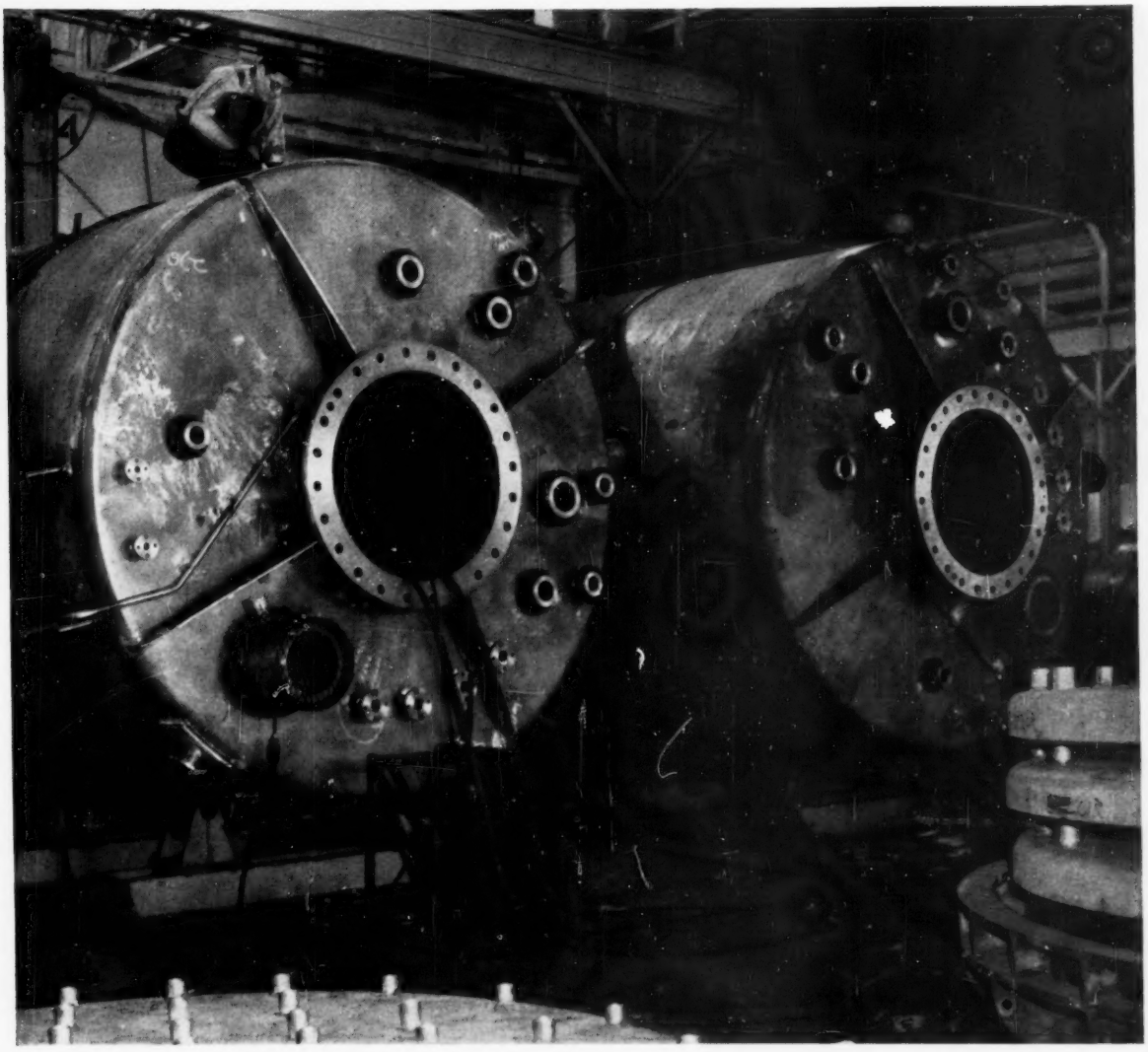
More Impressive: Considered more impressive at this stage are comparisons of the number of proposals made with those put into practice—of some 2,500 proposals, about 1,500 are now in actual practice. And, as the program has progressed, the percentage of approvals has increased—from about 25% at the beginning to the present 70%.

This high approval figure, says Dow, indicates that the program is more than just a fancy suggestion system, that problems are actually solved through the fundamental steps of analysis. However, the division does not attempt to get strict adherence to use of all the work-simplification tools, feels that chemical processes don't need the critical analysis required in cases where there is much more mechanical movement of the work.

Analytical methods are taught in a formal training program of 20 hours or more, given to as many men as possible. Although Dow's education department is responsible for the course and its contents, the production department provides the volunteer leaders (instructors) from previous trainees.

After training, department foremen pass the instruction along to plant operators. With each department running its own program, no full-time staff-level organization is needed. And the program is actually out in the plant, performed by those most familiar with daily plant routine.

Rewards and Maturity: Proposed projects are usually studied by a team. Project approval wins each member a mechanical pencil—a pen is awarded for five approved projects. The material rewards may not be great to the individual, but Dow's soft-sell approach is a vote of confidence in the maturity of the program's participants and their ability to realize the service they are performing.



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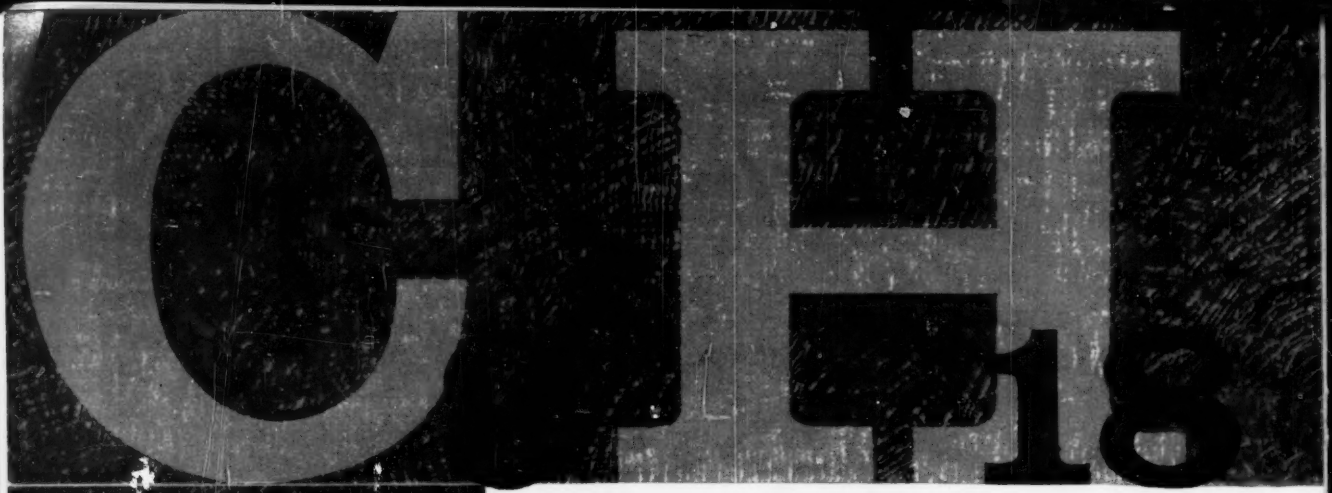

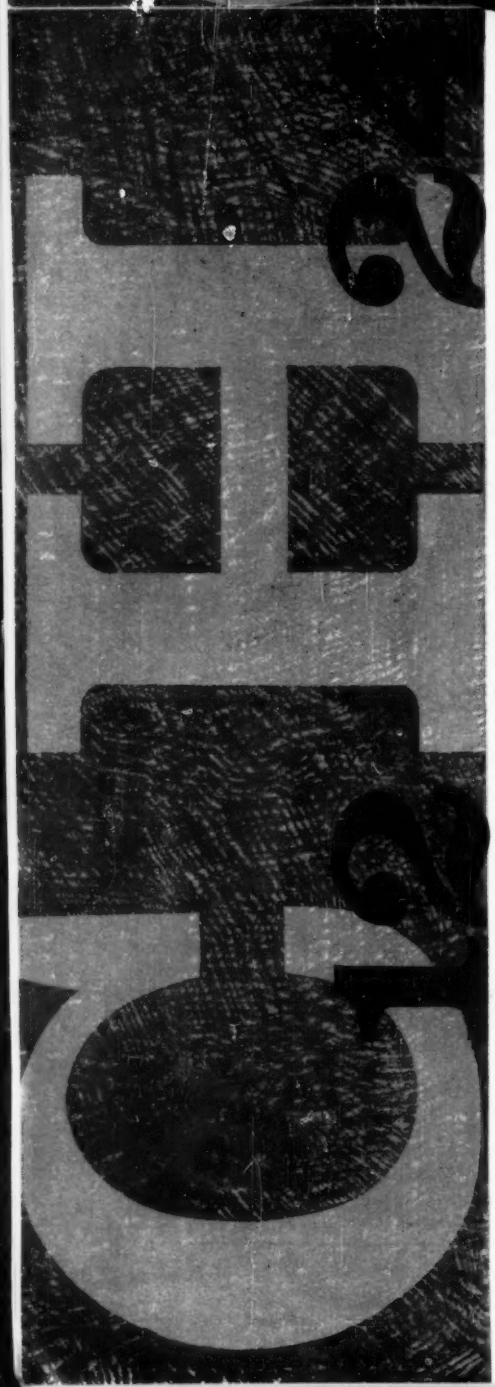

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Technology Newsletter

CHEMICAL WEEK
June 28, 1958

British nuclear power plants will produce plutonium-239—the fissile isotope used in atomic warheads—instead of nonfissile plutonium-240, the by-product currently produced for fuel enrichment uses. This switch by the Ministry of Defense last week came as an unexpected reversal of United Kingdom policy to divorce civil and military nuclear programs.

Since plutonium-239 production requires modification of power reactor systems, only the Hinckley Point plant (now under construction) and two 500-mw. stations planned at Trawsfynnid and at Dungeness are specifically scheduled to make the change. But later stations may also be affected.

It's estimated that two modified power stations alone could match the plutonium-239 output of the two Windscale piles, which have been shut down since the atomic "incident" last fall.

Principal effect of fissile isotope production will be to drop fuel-element life to about one-third the current optimum economic value (now about four years, based on a rating of 3,000 mw.-days/ton). Atomic Energy Authority declined to comment on how the change will affect nuclear power generating costs. But the new policy is expected to slash military plutonium costs, may enable the government to offer a more favorable credit for spent fuel elements—a move that could provide worthwhile cost reductions.

•

Solids fuels of the future won't look much like present ones. That's what *Aviation Week* is saying in this week's (June 23) issue. Writing on the latest trends in solid-fuel research, the magazine notes the emphasis on adding metals to present fuels to boost their performance.

But, in the case of composite propellents (a rubbery fuel with an inorganic oxidizer), there are limits to the amount of metal that can be added; the oxidizer makes up 80% of the total, and enough of the fuel must be retained to impart sufficient rubberiness. One alternative is to build some of the oxidizer into the fuel molecule. This cuts down the need for inorganic oxidizer, allows more metal to be added. Aerojet, *AW* reports, is experimenting along those lines, has successfully incorporated oxygen into a polyurethane molecule—without impairing its value as a binder.

Logical conclusion of the present trend, the magazine points out, would be a fuel made up exclusively of a light-metal hydride—lithium or boron—which is valuable as a carrier for hydrogen. The ideal oxidizer would be fluorine. It doesn't seem likely that such a fuel can be made plastic. But *AW* points out that it is possible to build plastic fluorine polymers. (Teflon and Kel-F fluorocarbons, not suitable for this application, are examples.) Thus, the solid propellents of the future may well turn out to be inorganic nonrubbery fuels mixed into rubbery oxidizers.

A new blood-clot dissolving enzyme, fibrinolysin, that may help control thromboembolic diseases was described in San Francisco this week at the annual meeting of American Medical Assn. Given by staffers of Ortho Research Foundation (Raritan, N.J.), the report stresses that the enzyme works by dissolving, not preventing, clots. None of the anti-coagulants now used is capable of dissolving a clot once the clot has formed. The new agent is getting clinical trials.

•

A new antidote for the deadly nerve gas sarin has been developed by Irwin Wilson, associate professor of biochemistry in Columbia University's college of Physicians and Surgeons. Wilson reports that in tests with mice PAD (pyridine-2-aldoxime dodeciodide) used along with PAM (pyridine-2-aldoxime methiodide) blocked the lethal action of sarin. When combined with atropine (a mild nerve gas antidote), antidotal properties of the compounds were said to be even more striking. Sarin is methylisopropoxyfluorophosphine oxide.

•

Full consequences of changing over to the metric system will be studied by a new committee of British Assn. for the Advancement of Science. The group is scheduled to report at the end of '59 on the "practicability, implications, consequences both international and domestic, and the cost of a changeover to the metric system or the decimalization of weights, measures and coinage."

•

Promising new methods of recovering radioactive cesium from atomic plant wastes have been worked out by chemists at the General Electric-operated Atomic Energy Commission Hanford Plant. Object: to make the radioactive element more plentiful for potential industrial uses (e.g., food preservation, drug sterilization, chemical synthesis) and at the same time make the waste safe for disposal in Hanford's desert land pits. The methods remove over 95% of the hot cesium.

•

New and higher-yield continuous fat rendering process has been developed by De Laval Separator Co. (Poughkeepsie, N.Y.). Called the Centriflow Rendering Process, it combines fat-rendering and centrifugal-separation techniques and is said to lower processing temperatures, reduce processing time, and still produce high-quality fat and protein. Other selling points: small size (about 250 sq. ft. of floor area with 14-ft. headroom) for 2,500-30,000-lbs./hour capacity; one-man operation of the entire system.

The first plant is now being installed at Agar Packing Co. (Chicago).

De Laval also has a separator to remove water from jet fuel. The machine, which will handle 200 gpm. of jet fuel, is now on test. Potential industrial applications are under study in addition to military- and civilian-aircraft applications.

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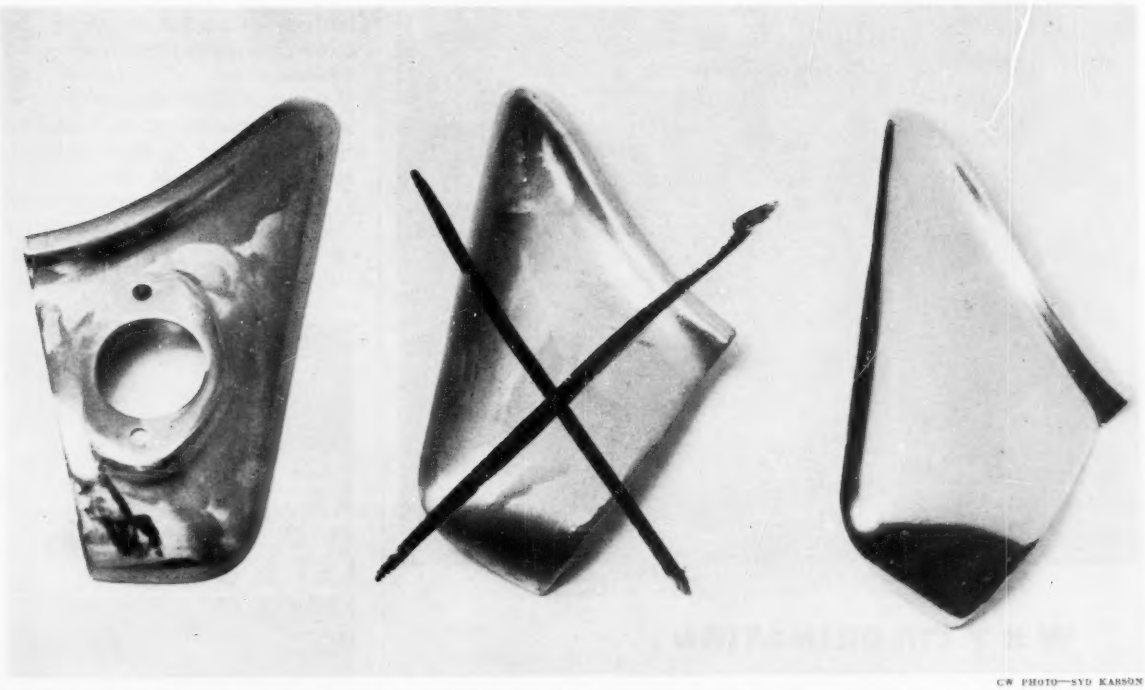

CW PHOTO—SYD KARSON

New level-plating process eliminates middle handling steps in producing chromed auto bumper guards.

Level-Plating – Shortcut to a Shine

At two auto plants this week, Du Pont researchers are scurrying to meet the deadline for the upcoming change-over to '59 models. Their goal: commercialization of a new bumper-guard copper-plating process developed by Du Pont's Electrochemicals Dept.

The new technique, now being scaled up, eliminates some expensive handling and polishing steps by permitting level plating on rough metal. The process has worked well in 300-gal. lab tanks, and, so far, few bugs have been encountered since it was adapted to the 29,000-gal. equipment used by the auto industry.

Secret of the process is a three-ply combination—two new chemical additives; particular attention to the plating cycle (plate 60 seconds, deplate 20 seconds, repeat cycle for 30 minutes); adequate circulation of the plating solution. Composition of the additives is still undisclosed, but Du Pont has revealed that they were found by screening several thousand materials by actual lab plating tests. Exactly how they work isn't known, either. One, called Elechem 1396, is an organic material that serves as a wetting agent and (copper) anode corrodant. The other, Elchem 1442, is a selenium compound that promotes plating of copper faster in the valleys of the rough metal surface than on the peaks.

Copper Saved: Bumper guards are made by drawing flat steel sheets into required shapes, then polishing with coarse grit. Though smoother than rough-drawn metal, this polished steel does not have the requisite mirror-like finish of the completed article (steel is difficult to polish). The guards are then plated with 0.001 in. of copper, subsequently buffed to a high finish, plated with nickel, then plated with a "flash" of chromium.

Now using the new process in two auto plants (unidentified), Du Pont hopes to skip the unracking, buffing and cleaning steps required prior to nickel- and chromium-plating. Added saving; no copper is lost through buffing. Also, plated parts will have better rust protection, since there's no buffing to thin the copper plate.

More Level Answers: Du Pont thinks the degree of leveling obtained with its new process is unique, points out that the technique has been under development for seven years.

Others however, are researching level plating, too. Harshaw Chemical Co. (Cleveland), for example, says its new Cuprex copper-plating process (acid copper) offers "excellent leveling" plus superior brightness, ductility and stability. Harshaw, a major supplier of electroplating chemicals, also claims big industrial gains with its Perflow-Perglow Duplex nickel-plating process, which yields bright, level nickel deposits *(see picture, p. 56)* on poorly polished steel or over dull copper plate.

These advances in electroplating follow some fairly recent developments in "electroless" (i.e., electrodeless) plating. First worked out by National Bureau of Standards, electroless plating can be used to build up smooth, uniform coatings of nickel and cobalt on metal surfaces (a practical method of depositing other metals by this process is unknown at this time). The principal chemicals

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used in both acid and alkaline bath methods of electroless plating are sodium hypophosphite and nickel chloride.

NBS applied for public-service patents on its process in Dec. '50 and has since licensed a large number of commercial firms free of charge.

General American Transportation Co. has done extensive engineering on the NBS process, has two large plants (Los Angeles and Chicago) for

Nonlevel (top) vs. level electroplating on brass (under 300x magnification).

plating the inside of railroad tank cars for use in shipping chemicals and other liquids. Apparently, the plating so produced is cheaper than previously used glass or enamel linings for chemical-carrying tank cars. Ferro Corp. (Cleveland) uses electroless plating to coat steel preparatory to enameling, gets better adhesion of the enamel to steel. At least 25 companies are using a variation of electroless plating processes.

These are generally used in situations where it is difficult or impossible to use an electroplating method — such as in plating in deep recesses, the inside of tubes or in corners. Flowing some of the plating chemical solution into these hard-to-get-at surfaces is relatively easy.

But the hypophosphite used in electroless plating is expensive and the electroless plating bath solution can't be kept for long periods. Conse-

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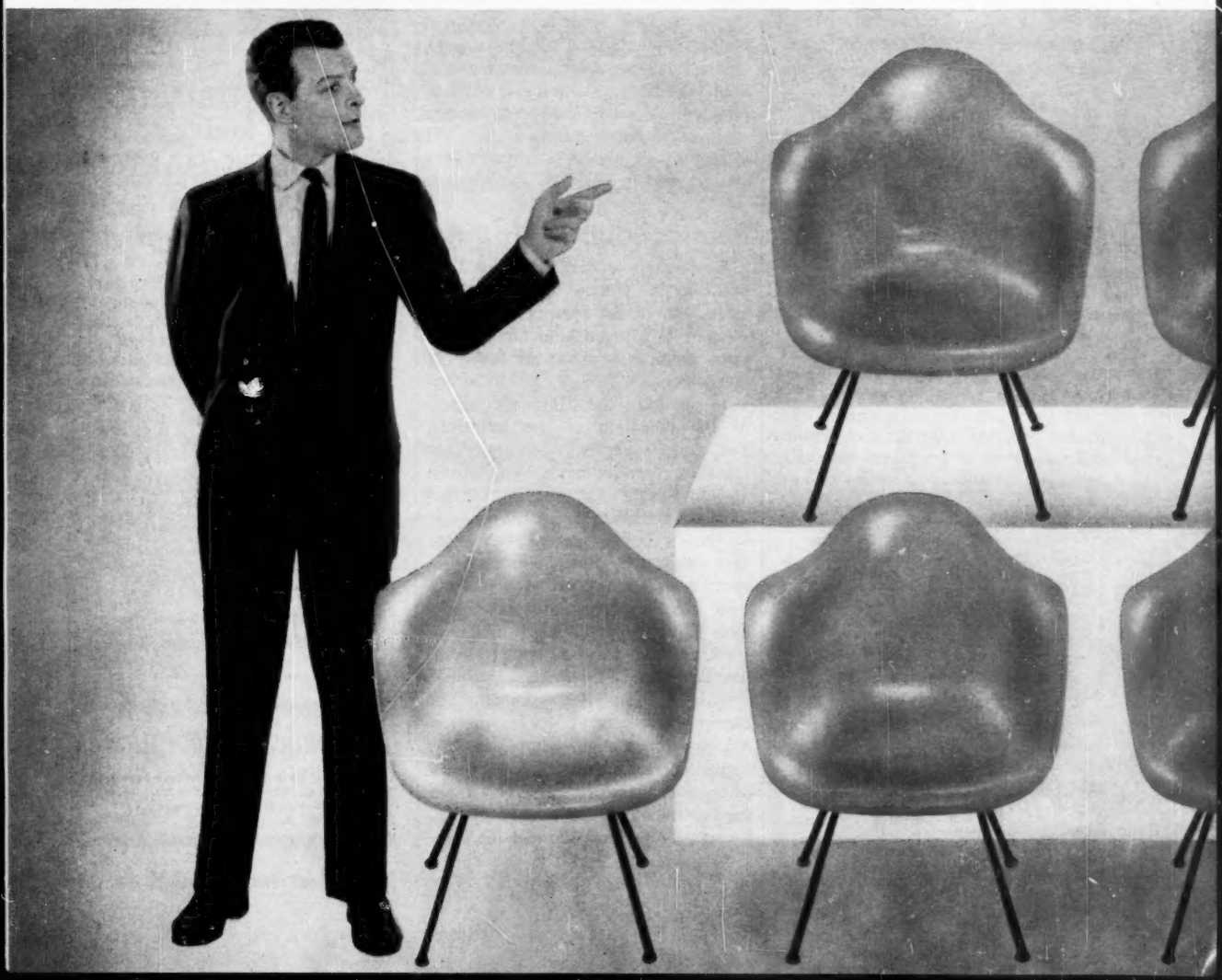

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quently, electroplating is cheaper and is used wherever possible.

With its new technique, Du Pont may be able to find new work for low-cost electroplating. The auto industry offers not so much a new market as a giant one. With that as a base, electroplating researchers may be able to move into many new areas.

New Arthritis Easer

Merck Sharp & Dohme has unveiled a new steroid hormone this week that's said to possess higher anti-inflammatory potency than any other steroid yet produced. The compound, named Decadron, is 16 α-methyl, 9 α-fluoroprednisolone (generically, hexadecadrol).

At St. Vincent's Hospital (Los Angeles) rheumatologist Edward Boland has been clinically evaluating Decadron and its related compounds for the last six months. He reports that in each of 21 patients in whom dosage comparisons were studied, Decadron was needed in strikingly smaller amounts than prednisolone to obtain the same antirheumatic effect. Metabolic studies showed that patients retained no extra sodium or water while using the drug.

Merck is pushing ahead with clinical tests in the U.S. and abroad.

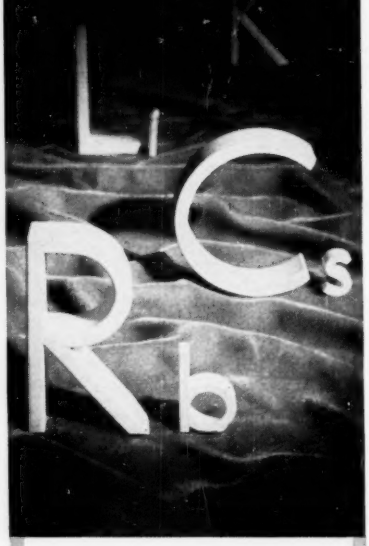
Semiconductor Update

Researchers at Bell Telephone Laboratories in Murray Hill, N.J., last week showed off some of their developments in semiconductors, offered some predictions about the future of the devices.

In marking the 10th anniversary of the invention of the transistor, Bell said its yearly expenditures for transistor development have grown 40-fold in the past decade. In that same time, the organization's total development budget was slightly more than doubled. Semiconductor development costs are expected to level off, then surge again as sales of the devices jump to perhaps $1 billion in 1968, compared with about $100 million last year.

Jack Morton, Bell's Director of Device Development, looks for germanium and silicon—commonly used semiconductor materials—to face new competition as more is learned about the hundreds of other potentially useful semiconductors. Intermetallic com-

new perspectives in alkali metal salts



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SUSPENDING AGENT . . . where "can stability" of paints has been improved with 0.1-2.0% Cab-o-sil, which retards the settling of high density prime pigments. Flow properties of such systems are also simultaneously controlled.

FLATTING AGENT . . . where flat varnishes formulated with 18% Cab-o-sil (based on total solids) have given 60° gloss meter readings of 35 on black carrara glass. After six months of storage, pigment settling is insignificant — 95% of the vehicle has been observed to contain suspended pigment.

THICKENING and GELLING AGENT . . . where small percentages of Cab-o-sil by weight are required to produce soft gels (corresponding liquids listed in order of decreasing polarity): 12% in water; 11% in ethylene glycol; 9% in butyl alcohol; 8% in turpentine; 7% in benzene.

THIXOTROPIC AGENT . . . where the addition of 1% Cab-o-sil to a nonthixotropic polyester resin has increased the viscosity from 410 centipoises (Brookfield viscosity) to 8,000 centipoises at 2 r.p.m. and 3,500 centipoises at 20 r.p.m.

ANTICAKING AGENT . . . where 10% Cab-o-sil has been used to prevent DDT from caking and 0.4% has produced a free-flowing sulphur.

ANTISLIP AGENT . . . here, antislip properties can be imparted to solvent base floor waxes by the addition of very small quantities of Cab-o-sil. A film of higher gloss also results.

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Surface Area (Nitrogen Adsorption)	175 − 200 m.²/gm.
Specific Gravity	2.1
Color	White
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pH (4% Aqueous Dispersion)	3.5—4.2

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RESEARCH

pounds such as indium phosphide and gallium arsenide look particularly promising. These are useful at higher temperatures (300-400 C), have been made into good rectifiers.

Morton thinks semiconductor devices will lead to computers with 10 to 100 times the speed and versatility of today's models. He envisions electronic systems that can learn from their past experience in helping themselves to solve new problems. "It may well be," said Morton, "that the extensions to man's mind made possible by solid-state electronics will yet have a greater impact upon society than the nuclear extension of man's muscle."

EXPANSION

• Sloan-Kettering Institute for Cancer Research (New York) has laid the cornerstone for a new, $4-million laboratory in Rye, N.Y., that will house studies in chemical compounds to control cancer.

• Standard Oil Co. of Ohio has dedicated a new, $2.5-million research center in Cleveland.

• Eastern Gas and Fuel Associates (Boston) will add to its laboratory at Everett, Mass., to expand research in coal, coke and coke chemicals.

• Linde Co., a division of Union Carbide Corp. (New York), has added a radiation laboratory with a cobalt-60 source at its Tonawanda, N. Y., location.

• M&C Nuclear Inc. (Attleboro, Mass.) has completed a new lab wing to house product control and development research on nuclear fuel element fabrication.

PRODUCTS

Polyvinyl Paint Base: Colton Chemical Co. (Cleveland), a division of Air Reduction Co., is out with Colton Flexbond Exp. F-186, a polyvinyl acetate copolymer emulsion that permits manufacture of water-based aluminum paints.

•

Flexible 'Foil': Platilon, a high-temperature polyamide "foil" or film has been developed by Plate GmbH. (Bonn, Germany). The film has a melting point between 430-445 F, is said to have extreme resistance to oils, a high tensile strength, and good abrasion-resistance.

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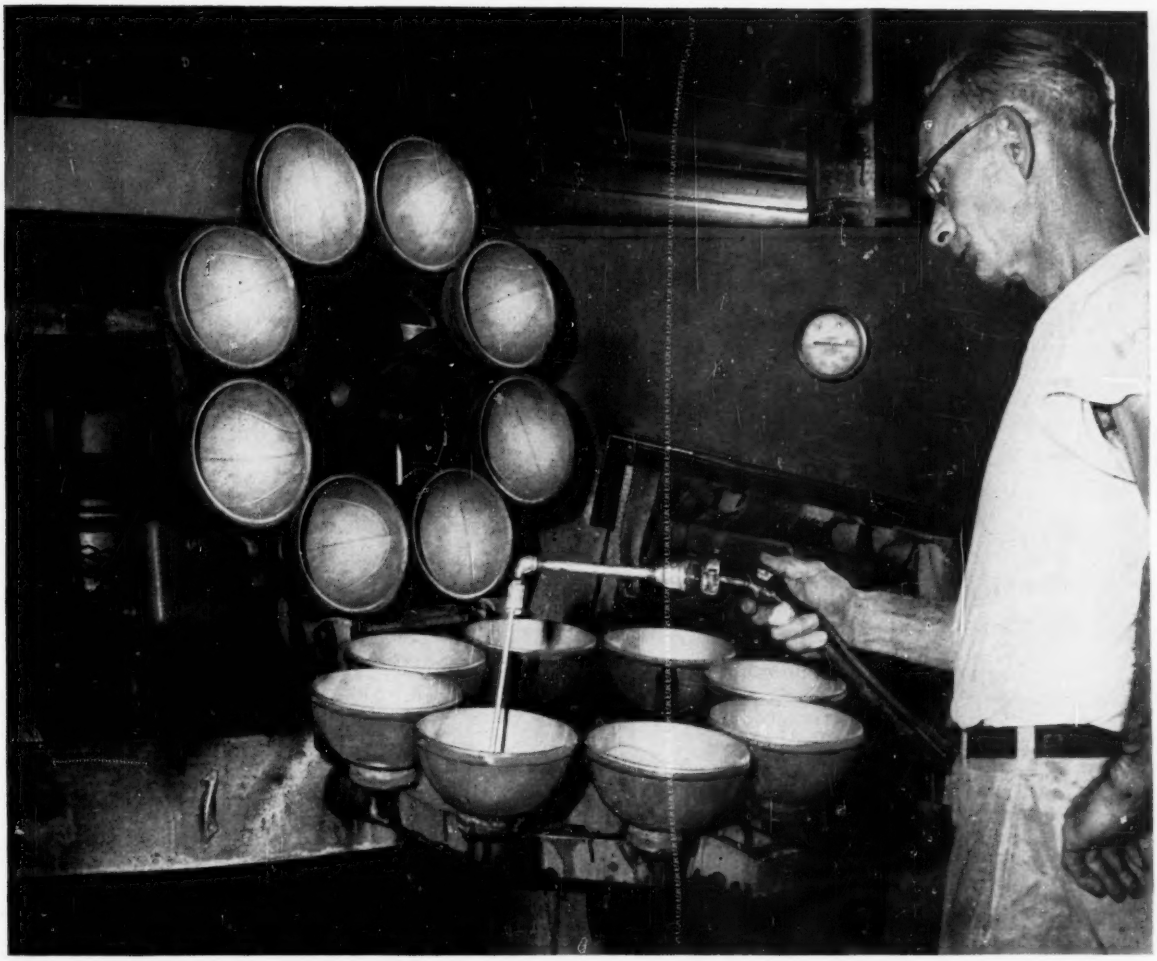

Photo courtesy National Latex Products Company, Ashland, Ohio.

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Na_2SO_4	99.5% or better
Na_2O	.05%
B_2O_3	.05%
NaCl	.07%
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Solution	Clear
Color	White

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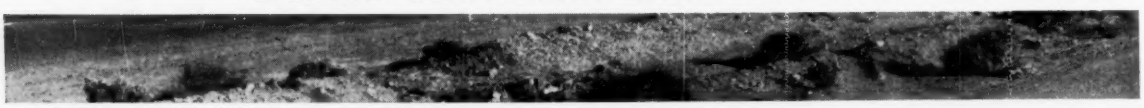


Market Newsletter

CHEMICAL WEEK
June 28, 1958

Are major chemical companies using cut-throat tactics in pricing? How prevalent are thinly disguised "discounts," under-the-counter prices? A *Wall Street Journal* story last week, charging that some chemical makers are "secretly" trimming prices to combat the slump in demand, is sparking plenty of comment within the industry.

A *CW* spot-check among knowledgeable chemical sellers elicits this consensus: some buyers are getting price breaks; but in the few instances that major firms are selling at other than posted prices, local competitive conditions warrant it. There are cases, too, where deals are being made on "distress" material. On the whole, though, despite the slackened tempo of demand for most chemicals and excess capacity in just about all lines, under-the-counter tactics aren't as widespread as the newspaper article implies.

Most price changes, insists the trade, are aboveboard and openly posted.

Lower nitrogen-solutions prices are being quoted this week by all producers, as expected (*CW Market Newsletter, June 21*). Allied Chemical had tried to hold the price line by extending its $128/ton tag through December, but gave in when a lower trade price ($120/ton) was posted by Phillips, Monsanto and others.

Allied also went along with the industry's "off-season" reductions on ammonia, "to meet the competition." Anhydrous material, for delivery during August and September, will be pegged at $80/ton, an $8/ton reduction from the current price.

The price cuts posted on methanol earlier this month are still reverberating through the trade. When Du Pont lowered prices and changed its methanol shipping procedures (*CW Market Newsletter, June 7*), some companies met the new schedule right down the line. One instituted change: f.o.b. terminal price was eliminated in favor of delivered prices for all consumers.

This week, Du Pont is again quoting an f.o.b. price, but in addition to its tags on deliveries. Commercial Solvents, for one, held firm to its f.o.b. terminal price structure, though lowering it to 25¢/gal. (in bulk) at Eastern points, and 29¢/gal. on the West Coast. Du Pont's prices are now "competitive."

The price trend is up in nonferrous metals. Custom smelters, for example, tacked another ½¢/lb. onto their copper prices last week, setting the tab at 26½¢. It was the eighth straight hike for smelter copper in the last couple of months.

Of more significance, perhaps, was last week's first upward price move by a primary copper producer since Feb. '56. Anaconda advanced its quote to 26½¢/lb., compared with the 25¢/lb. price producers

have held since the beginning of this year. The move—which will probably be followed by others this week—puts copper closer to the 27½¢/lb. price the government would pay should it start stockpiling again (*CW Washington Newsletter, June 21*).

•

U.S. lead prices also turned upward last week for the first time since early '56. In rapid order, major sellers posted an 11½¢/lb. tag. The ½¢/lb. advance erased a ½¢ drop early this month. Chances are that the new price will mark the bottom of lead's current skid.

Industry spokesmen aren't ready to say that further hikes are imminent but at least one expects "no near-future reductions." Reason, of course, ties in with Washington's proposed supports.

•

Chances are slim that aluminum will be added to the government's proposed metals' subsidy program despite proponents' arguments that the industry is burdened with layoffs and competition from Iron Curtain aluminum. Interior Secy. Fred Seaton last week noted that some aluminum stockpile contracts still exist, that levels of activity aren't low enough to warrant aid and that the U.S. aluminum industry is "mainly processing, not mining," which is his concern.

•

Meanwhile, industry expansion continues. Aluminum Co. of America last week revealed that it plans to begin production in two new potlines at Massena, N.Y., in the fall. The startup completes the first phase of a multimillion-dollar modernization and expansion program at that location. The new lines will have an initial total capacity of 54,000 tons/year. In addition, two other potlines will be reactivated, boost production potential an additional 36,000 tons/year.

Startup of the new lines, however, will bring about permanent shutdown of four small obsolete units now turning out 27,500 tons/year.

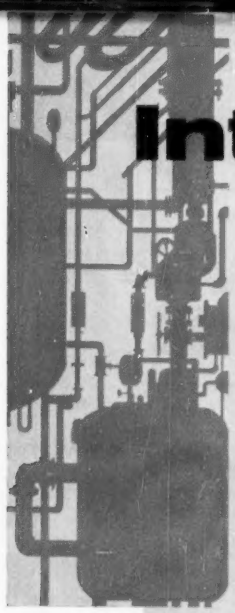
•

Price reductions for polyvinyl alcohol customers of Colton Chemical (Cleveland, O.) are now in effect. Cuts in Vinol prices (from 3% to 15%, depending on grades and quantities) apply to partially acetylated and fully hydrolyzed grades, says President Bernard Krashin. A new list of complete prices is available from Colton.

SELECTED PRICE CHANGES—WEEK ENDING JUNE 23, 1958

	Change	New Price
UP		
Lead, metal prime, pigs, N. Y.	$0.005	$0.115
Lead, red, 95% Pb_3O_4 or less, bbls., c.l. wks., frt. equald.	0.005	0.1375
Litharge, powd., coml., bbls., c.l., frt. equald.	0.005	0.1325
DOWN		
Mercury metal, 76-lb. flask	$1.00	$228.00
Platinum metal, wks., oz.	2.00	62.00

All prices per pound unless quantity is stated.



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ACETYL CHLORIDE
ANISIC ALDEHYDE
ANISYL ACETONE
ANISYL ALCOHOL TECH.
ANISYL CHLORIDE
ANISYL CYANIDE
AZELAOYL CHLORIDE
BENZALACETOPHENONE
BENZHYDROL
BENZHYRYLAMINE
BENZHYDRYL CHLORIDE
BENZOPHENONE TECH.
BENZYL ALCOHOL TECH.
BENZYL CYANIDE
BUTYROYL CHLORIDE
n-CAPROIC ACID
CAPROYL CHLORIDE
CAPRYLOYL CHLORIDE
p-CHLORBENZOPHENONE
p-CHLORBENZHYDROL
p-CHLORBENZHYDRYL CHLORIDE
p-CHLORBENZYL CYANIDE
CINNAMOYL CHLORIDE
DIBENZYL ETHER
DICYCLOHEXYL CARBINOL
DICYCLOHEXYL KETONE
p,p'-DIMETHOXYBENZOPHENONE
DIPHENYL ACETONE (unsym)
DIPHENYL METHANE
ETHYL FORMATE TECH.
ETHYL PHENYLACETATE
beta IONONE
ISOBUTYROYL CHLORIDE
ISOVALERIC ACID
LAUROYL CHLORIDE
p-METHOXY PHENYLACETIC ACID
METHYL HEPTENONE
METHYL PHENYLACETATE
MYRISTOYL CHLORIDE
OLEOYL CHLORIDE
PALMITOYL CHLORIDE
PHENYLACETIC ACID
PHENYLACETONE
PHENYLACETYL CHLORIDE
PHENYL PROPYL ALCOHOL
PHENYL PROPYL CHLORIDE
POTASSIUM PHENYLACETATE
PROPIONYL CHLORIDE
PROPIOPHENONE
SEBACOYL CHLORIDE
SODIUM PHENYLACETATE
STEAROYL CHLORIDE
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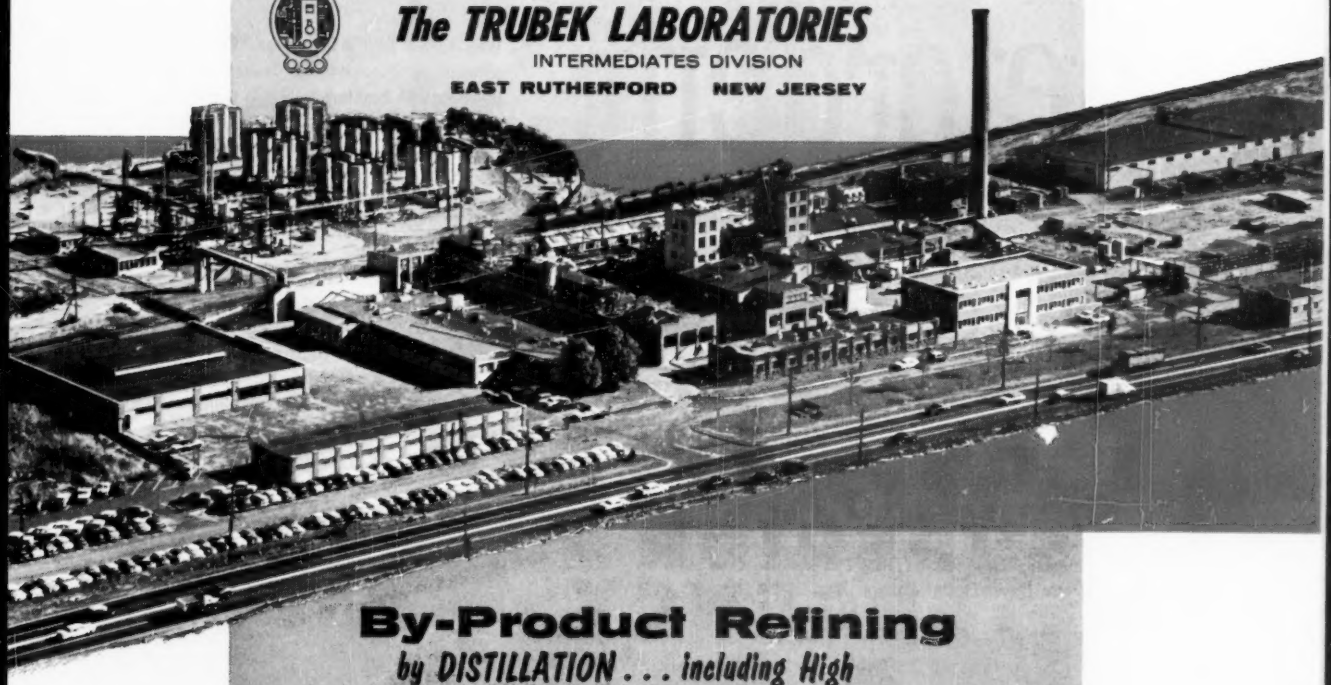

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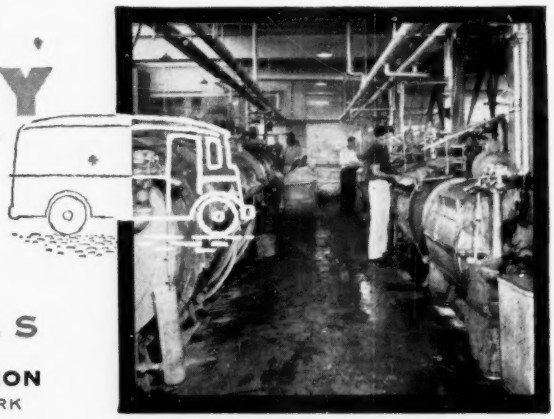

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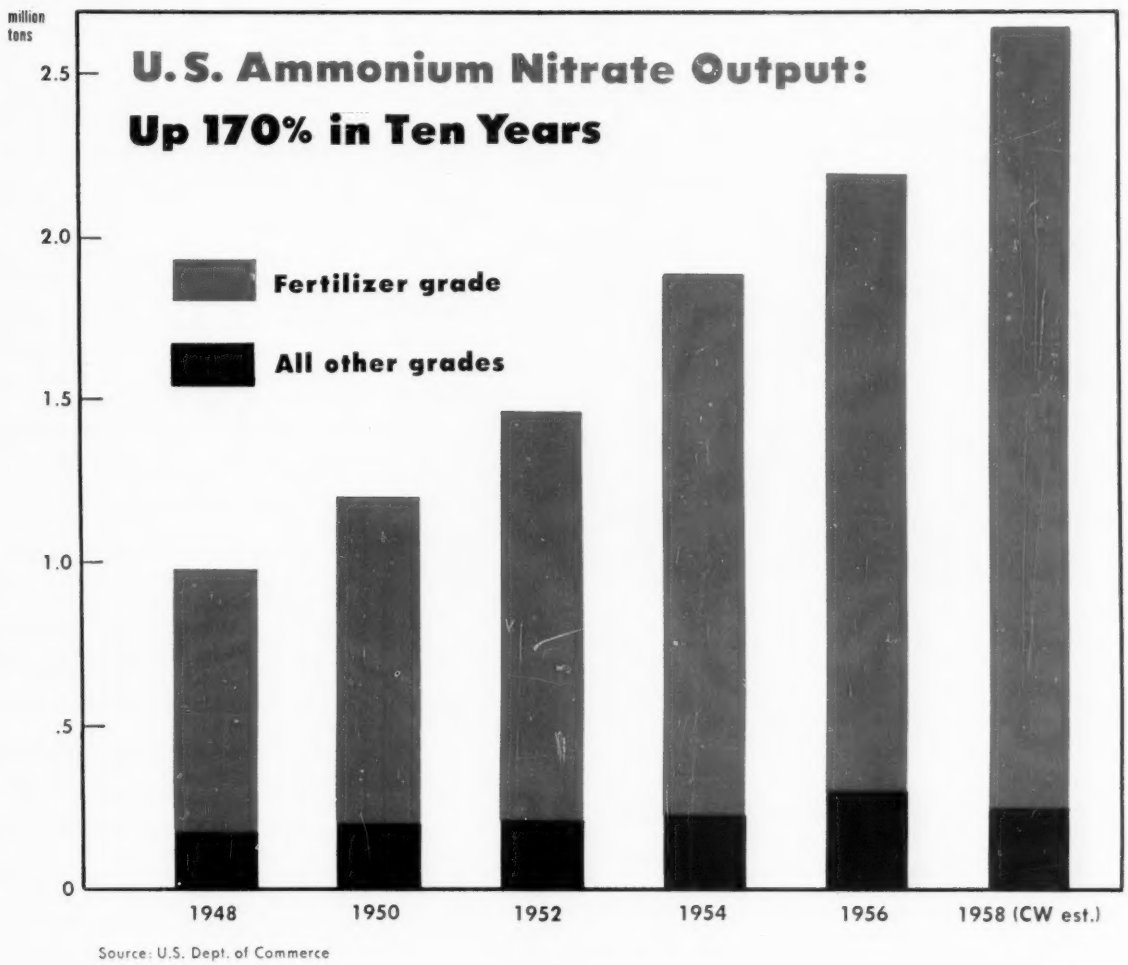

Source: U.S. Dept. of Commerce

. . . And Plenty of Growth Still in Sight

A record output in '58 is in sight for U.S.-made ammonium nitrate. CW's just-completed midyear survey of producers indicates that an estimated 2.65 million tons — some 90,000 more than in '57 — will be turned out this year.

Backbone of the booming industry is, of course, agricultural demand, which accounts for the impressive 170% production jump of fertilizer-grade material in the past decade. This year, fertilizer grade will take 2.4 million tons of the total ammonium nitrate output.

And the industry's good prospects are further brightened by a marked increase of interest in the use of the fertilizer grade in explosives — a market area formerly limited to industrial-grade material.

Fertilizer Growth Factors: Two important trends propelling ammonium nitrate expansion are (1) increased use of nitrogen as a primary plant nutrient and (2) a steady shift toward use of materials of higher nutrient concentrations.

This year, the nation's farmers will use an estimated 2.3 million tons of primary nitrogen (compared with less than 1 million tons/year 10 years ago). Ammonium nitrate — with 33.5% nitrogen content—apparently will supply about 31% of the nation's total nitrogen needs in '58—which trade observers say equals about 2.15 million tons of ammonium nitrate.

Paralleling growing demands for fertilizer nitrogen is the trend toward higher nutrient content in plant food for both farm and garden use.

While total tonnage of fertilizer has leveled off in recent years, U.S. consumption of plant nutrients is gaining. This year, fertilizer concentration of primary plant nutrients is about 29%; in '48, it was near 21%.

Application Trends: Despite adverse weather conditions, some 1.17 million tons of the fertilizer grade (51% of total use) will this year be applied to the soil directly, in solid form. It's the second-highest annual tonnage so

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applied. Direct application of ammonium nitrate has become popular mainly because of improved granulation processes that provide cake-free, easy-to-handle products.

Direct application in solution form is also making headway, though the total quantity so applied — about 69,000 tons (3% of total fertilizer grade used)—is still relatively minute and is not expected to make spectacular strides.

Far more important is use of ammonium nitrate in ammoniating solutions that provide nitrogen in production of mixed fertilizers. Some 870,000 tons (38% of total fertilizer grade) of the ammonium compound will be used this way in '58 — about 100% more than was used for ammoniation four years ago. Further use of this application method is expected.

Explosive Spark: Well beyond field-test stages, the use of fertilizer-grade ammonium nitrate in blasting has become a standard operation in heavy construction, quarrying and strip mining of coal. At least one coal producer is known to be using the fertilizer grade (in conjunction with liquid hydrocarbon) almost exclusively as a blasting agent.

The volume of nitrate used in explosives is still small, but it's increasing; an estimated 115,000 tons will be exploded in '58 in strip mining and similar operations.

Why has this application come to the fore only recently? Lack of knowledge and a shortage of the chemical were the main progress-slowing factors, says one producer. Now, supplies are ample, and an industry-sponsored education drive is

End-Uses of Fertilizer-Grade Ammonium Nitrate in '58

Direct application, solid	51%
Direct application, liquid	3%
Ammoniating solutions for dry-mixed fertilizers	38%
Ammoniating solutions for liquid-mixed fertilizers	1%
Explosives	5%
Miscellaneous industrial uses	2%

Fertilizer Glossary

Primary plant nutrients: Nitrogen, phosphorus and potassium are considered the three basic primary plant nutrients in fertilizer production.

Mixed fertilizers: contain two or more primary plant nutrients in dry or solution forms.

Direct application: Conventionally, this refers generally to the application of nitrogen in all forms not in combination with other primary plant nutrient. One exception is ammonium phosphate, a single chemical but which supplies two plant nutrient elements.

Nitrogen solutions: usually combinations of ammonium nitrate-ammonia, or urea-ammonia in solution form, with nitrogen content of 20-37% concentration.

Ammoniating solutions: nitrogen solutions of higher nitrogen concentration (40-47%) used as a source of nitrogen in the production of mixed fertilizers.

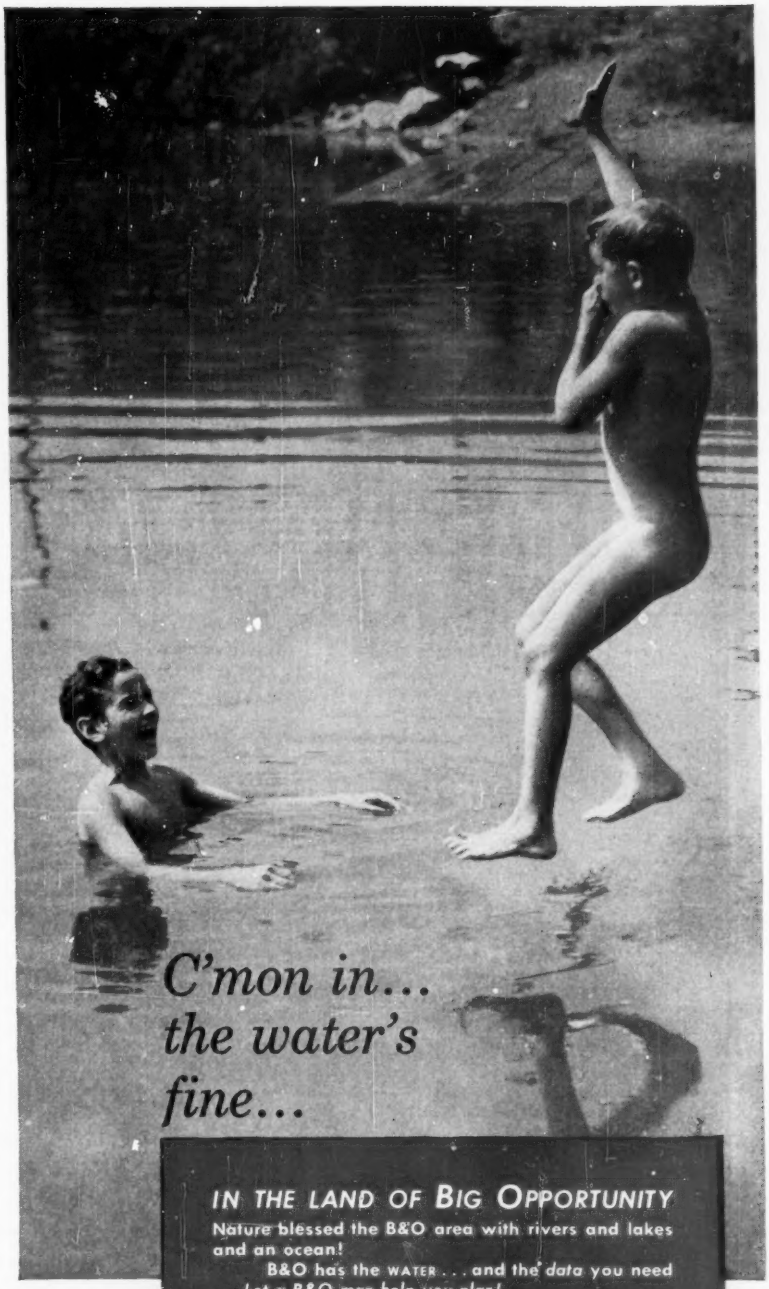
paying dollar dividends in this new market.

Miscellaneous industrial uses of fertilizer-grade ammonium nitrate amount to a small 45,000 tons this year; chief among these applications is leaching of uranium ore.

Industrial Grade Down: Less than 10% of all ammonium nitrate is industrial-grade material. The bulk of that has been going into explosives. The shift toward use of the less-expensive fertilizer grade, say some observers, is the main reason why demand for industrial-grade material has fallen off.

This year, output of the industrial grade will probably be 250-260,000 tons. In '57, output was 270,000 tons; in '56, about 310,000 tons.

Despite the nation's general economic conditions, all indications are that the ammonium nitrate industry's expectations of a record production year in '58 will be realized. And it's a good bet that this business—like any other that can boast of steady gains this far into the recession period—can safely anticipate more and larger gains when the nation's economy improves.



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New Tests Bring Back Lightweight Drums

Less costly, light-gauge steel drums may soon be practical for the chemical industry. That's the interpretation chemical packaging men are giving this week to a decision of the railroad association's Official Classification Committee.

The decision, not yet officially published, will permit the use of 55-gal., 20-gauge steel body, tight-head drums for nonregulatory (nonhazardous) products in single-trip service. But despite substantial evidence presented by Manufacturing Chemists' Assn., the committee did not okay the drums for reusable service.

The "workhorse" drum of the industry has 18-gauge (0.0478-in.) walls and heads; the 20-gauge (0.0359-in.) drum has 18-gauge heads, weighs about 7 lbs. less than its 18-gauge counterpart. Moreover, the 20/18 drum will sell for 45¢-65¢ less than the 18/18 drum.

From 1938 to '50, the 20/18 drum was a committee-sanctioned container, but fabricating difficulties caused drum producers to request delisting. Now, improvements in manufacturing processes have eliminated the difficulties.

MCA's Chemical Packaging Committee and the Steel Shipping Container Institute have been spearheading the drive to get approval of the light-gauge drums for reuse and for nonregulatory products. Until now, the 20-gauge containers have been authorized for only regulatory (hazardous) products and on a single-trip basis. These restrictions have made it impractical for chemical companies to swing over to the lighter—and less expensive—drums. As a result, only a few hundred thousand 20/18 gauge, 55-gal., tight-head drums are made annually.

Savings to the chemical industry that would result from the adoption of the lighter containers are potentially large. Last year, chemical firms consumed 40-50% of the 20.9 million light- and heavy-gauge, tight-head drums manufactured. (The petroleum industry bought much of the remaining output.) Buying 100,000 lighter drums/year would save some $45,000 - $65,000.

The net saving, however, may be somewhat less if the drum purchaser sells drums to reconditioners. The 20-gauge containers have little resale value now because carrier regulations restrict the drums to single-trip use. And even if carrier classification committees eventually approve the 20-gauge drums for multitrip use, reconditioners may not buy them at the same price ($1.50-$2.50/drum) they now pay for 18-gauge containers. Drum reconditioners claim that 18-gauge drums have a longer service

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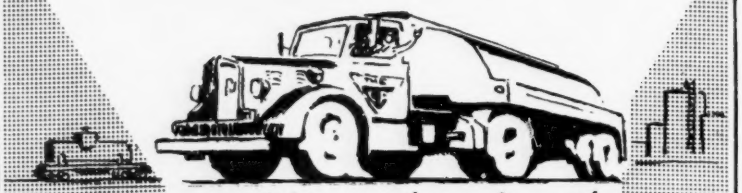

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life and, hence, a lower per-trip cost than 20-gauge drums.

Uphill Fight: Controversy about their suitability for reuse has been the big stumbling block in gaining approval for the light drums. The National Barrel and Drum Assn. (NBDA), representing many reconditioners, has opposed the light-gauge drums, claiming that they are too light to take frequent reconditionings. Large meat packers and petroleum companies have also bucked the 20-gaugers—but for different reasons. They are believed to be the two largest markets for reconditioned drums, and they fear that their supply of low-cost drums will dwindle if 20-gauge containers replace 18-gaugers.

Test Program: MCA's activities have been aimed squarely at proving the reusability of the 20-gauge containers. Packaging experts from MCA-member companies set up a test-shipping program for 135 of the 20-gauge drums, filled with rust-inhibited water. These drums were shipped by rail between Buffalo, N.Y., and Philadelphia, Philadelphia and South Charleston, W. Va., Philadelphia and Midland, Mich. and back. One truck shipment, from South Charleston to Philadelphia, was also included. The drums received three commercial reconditionings and one in-plant reconditioning during the test period. After each shipment, chemical-packaging engineers inspected the condition of each drum. Some 18 companies participated.

Results, says MCA's transportation and packaging engineer, C. H. Mayhood, clearly indicate that the 20-gauge drums are suitable for reuse and reconditioning. Only four drums developed leaks. And appearance after reconditioning demonstrated that the drums could be successfully reconditioned. The testing was stopped after five shipments, Mayhood told *CW*, because reusability of the drums had been demonstrated — not because the drums were unsuitable for further use.

MCA presented the test results to the Classification Committee. NBDA took exception to the findings as "inconclusive," cited the lack of test data on denting caused by rolling when shipped, distortion caused by stacking full drums and rust damage.

Next Move: In permitting single-

trip use of 20-gauge drums for nonregulatory products, the Classification Committee based its decision on two main points:

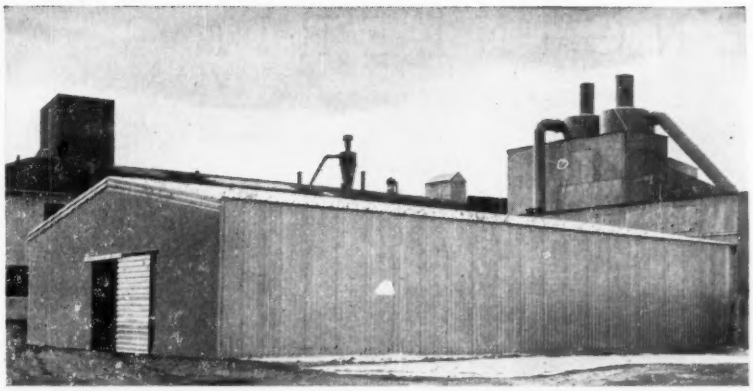
- Opposition from some rail carriers on the ground that the evidence was insufficient to establish suitability of drums for reuse.
- Some groups, seeking approval of the lighter drums for nonregulatory products, have requested approval for only single-trip use.

MCA will continue to push for acceptance of the drum for multitrip use. Its next move, however, has not yet been worked out, but it may make use of existing appeal procedures.

Meanwhile, the light-gauge drums come before the motor freight Classification Committee next week. If the motor carriers okay the drums for reuse service, the rail committee members will almost certainly review their decision. If the motor carriers approve only single-trip use, chemical shippers will have to weigh carefully the economics of using the 20-gauge containers.

DATA DIGEST

- **Isobutyl acetate:** Lacquer solvent systems employing isobutyl acetate are described in 8-page brochure. Charts compare product with other principal medium-boiling acetates and ketones and effect of these solvents on viscosities of various polymers. Eastman Chemical Products, Inc. (New York).
- **Solvent:** Diethylene glycol dimethyl ether is the subject of a new technical bulletin. The product is suggested as an anhydrous reaction medium for organometallic reactions, solvent for inorganic salts and for use in the synthesis of organoboranes and boron-nitrogen polymers. Organic Chemicals Division, Olin Mathieson Chemical Corp. (New York).
- **Rubber extenders:** 24-page brochure presents a graphic way to select oils for use in compounding and extending butadiene-styrene rubbers. Sun Oil Co., Industrial Products Dept. (Philadelphia).
- **Acetylene derivatives:** Folder tabulates specifications, chemical properties and uses of polyvinylpyrrolidone, its derivatives and copolymers, uses of 1, 4-butanediol, butynediol and propargyl bromide and alcohol. Antara Chemicals Division, General Aniline & Film Corp.



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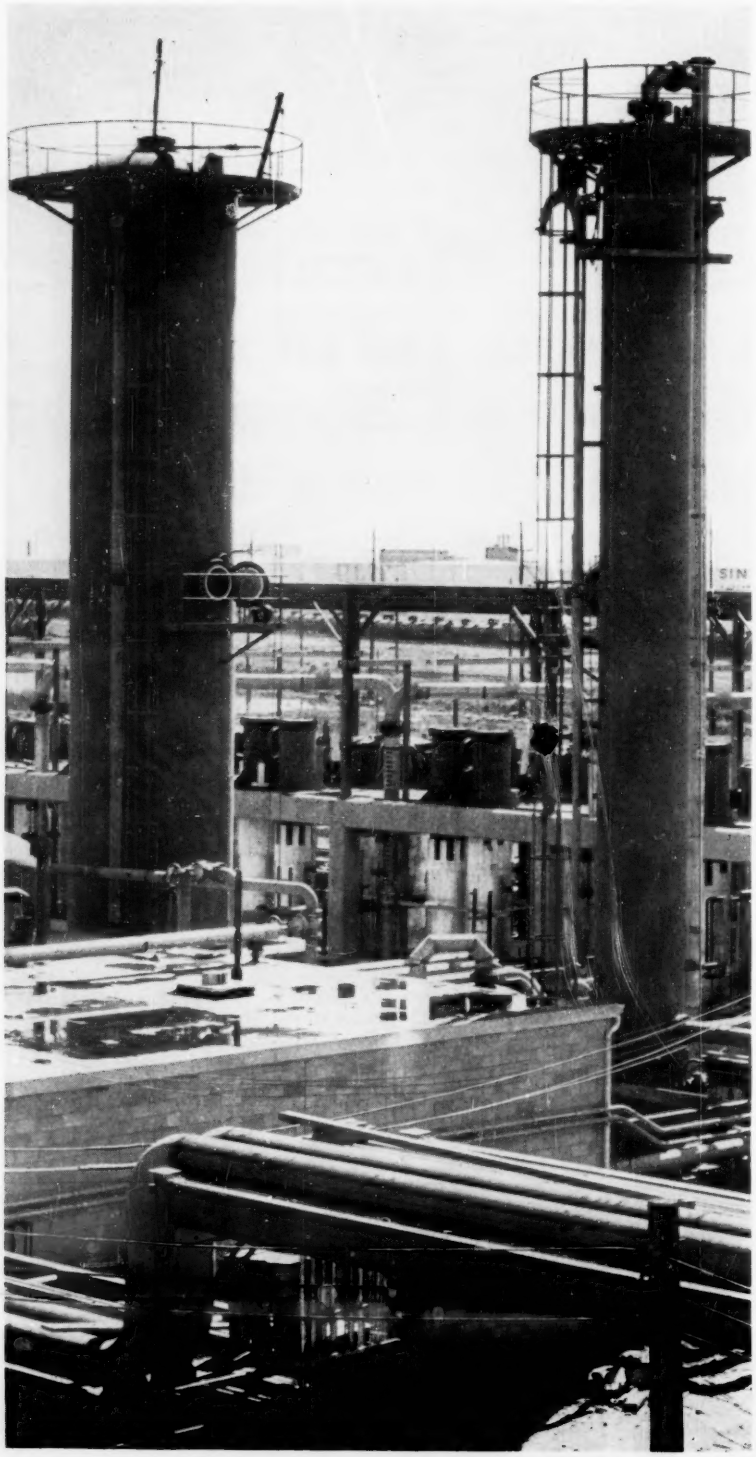


AIR OXIDATION Battery of reactors at GAF's Linden, N.J., oxide plant loom up behind building in foreground.

Two Routes to Which Will

The two reactor systems pictured on these pages are a thousand miles apart, geographically, and just about the same distance, technologically. But they have a lot in common, too: Both are parts of brand-new ethylene oxide plants of the same size, 60 million lbs./year. Both use a direct oxidation of ethylene over a fixed bed of silver catalyst. Both are fed by Standard Oil of New Jersey ethylene plants. And both have been delayed in their startups because Standard Oil has been plagued with trouble in putting its ethylene plants on the line.

Still, the differences between the two are more significant than the similarities. For they use entirely different processes. And although much of the information about the processes is confidential, chemical management this week has a rare opportunity to compare them in broad strokes.

The reactors pictured on the right-hand page are at Wyandotte's new, $11-million plant at Geismar, La., built by Lummus. It will be the first plant in the world to come on-stream using the Shell-developed process for making ethylene oxide. (Two others of similar size, however —Calcasieu Chemical's at Lake Charles, La., and Shell Chemical's at Partington, England—will probably start up before the summer is over.)

The reactors shown on the left belong to General Aniline & Film's $8-million ethylene oxide plant at Linden, N.J. It employs the Scientific Design process.

The main point of distinction between the two oxidation processes is that Shell uses oxygen while Scientific Design does it with air. But that, in turn, calls for a number of differences in the reactors and auxiliary processing equipment. Here's why:

When ethylene is oxidized to the oxide, only a portion is converted on each pass. Oxide is removed and the unoxidized material is sent back to the reactor. But if air is used as the oxidizer, the gas contains appreciable amounts of inert ingredients, such as

Ethylene Oxide: Prove Better?

nitrogen. This must be purged from the system to make room for fresh ethylene and oxygen in the reactor. But the gas that's purged contains ethylene—as much as 20% of the original feed. Loss of ethylene at those levels makes the whole process uneconomic.

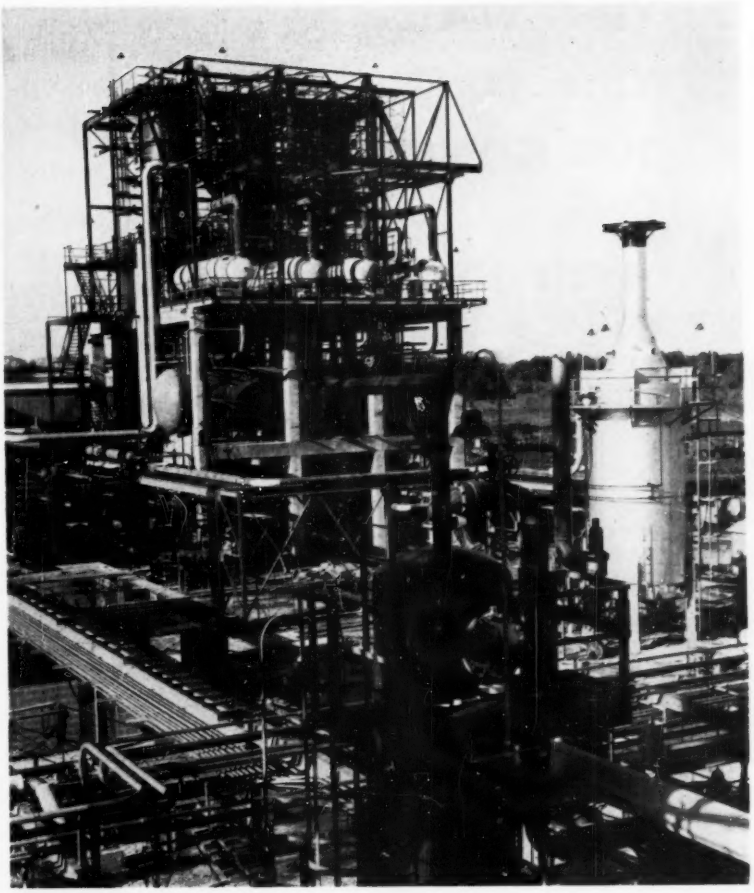
Scientific Design side-steps this by means of a patented second reactor (U.S. 2,693,474), its so-called purge reactor. By proper manipulation of the process, it is able to get good yields of oxide, based on ethylene that is consumed.

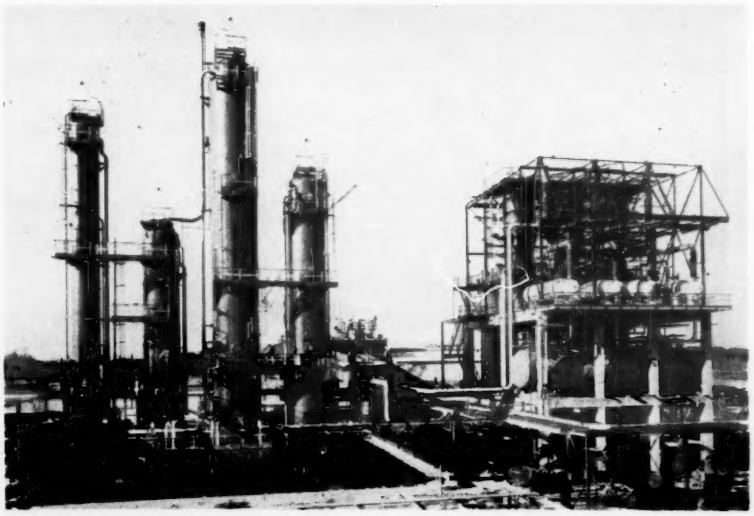
Since the Shell process employs oxygen, no nitrogen is present and there's no need for a purge. Carbon dioxide and ethylene oxide are stripped in a tower with hot carbonate, and unconverted ethylene is fed back to the reactor. The carbonate stripping, incidentally, is the Bureau of Mines development that made its debut in Escambia's ammonia plant (*CW, March 3, '56, p. 54*).

Neither Shell nor Scientific Design will say much about their reactors. Both are believed to be tube bundles. Shell employs kerosene to cool the exothermic reaction, Scientific Design uses a different (unidentified) coolant. Other differences are apparent from the pictures. Shell, for instance, uses only three big reactors for the 60-million-lbs./year plant. Scientific Design employs more but smaller ones.

There are differences in the catalyst as well. Scientific Design's patented version (U.S. 2,752,362) is silver (with a roughened surface) deposited on smooth, spherical inorganic refractory. Shell's catalyst—made for Wyandotte by Harshaw, for Calcasieu by Davison—uses a different carrier and different method of deposition.

The Case for Oxygen: Not unexpectedly, there are some sharp differences of opinion about the relative economics of the two approaches. Shell feels that air may be preferable for small plants but says the economics swing toward oxygen when annual production is to hit 10-20 mil-





OXYGEN OXIDATION Large unit (top) houses three Wyandotte reactors; towers (bottom) recover oxide.

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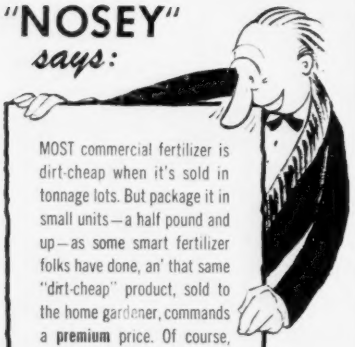

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lion lbs. Shell points out that it offered its licensees a choice of oxygen or air, believes their choice of oxygen is significant.

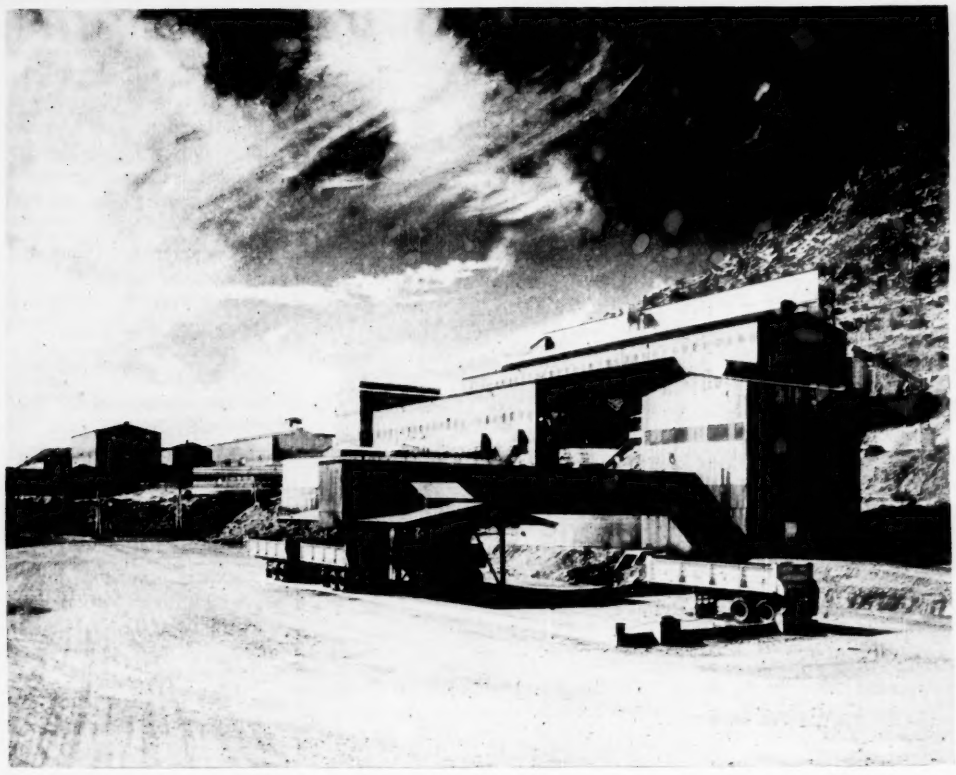
Wyandotte technical management people say they were attracted to the Shell process by what they call its inherent "simplicity." They had an opportunity to buy Scientific Design's process but chose the use of oxygen over the dual reactors. Capital costs were a stand-off between the two, they say, adding that, if anything, Shell's process may have had a slight edge. They explain that the cost of the oxygen plant is offset by the fact that equipment size is smaller.

When Lummus obtained rights to build plants using the Shell process (*CW, May 23, '53, p. 48*), it reported that the catalyst should last a year between regenerations and that the yields from the process were 58.6%. Wyandotte engineers are optimistic on catalyst life but admit that Lummus's statements represent extrapolations, don't necessarily reflect plant experience accurately. On the question of yields, they feel that the process will be "highly competitive" with Scientific Design's.

Wyandotte engineers make it plain, too, that theirs was a free choice based on technical considerations and that there was no question of reciprocity. But that doesn't mean that Shell won't buy any of the output. Wyandotte President Bob Semple, who says that the first year's output is already accounted for, frankly expects some of it will go to Shell.

The Case for Air: Scientific Design, on the other hand, can't see the rationale for using oxygen, which, of course, it has also looked at. It points out that in exchange for a dual reactor system, the Shell licensee has to ante up a heavy investment in oxygen-making facilities and a carbon dioxide scrubber.

SD engineers find it hard to believe that capital costs for the two plants are equivalent. They admit it's difficult to compare costs of different plants because of a number of variables. But they point to GAF's $8-million investment in Linden "in the middle of the high-cost labor belt" and compare it with Wyandotte's $11-million outlay at Geismar. They realize that Wyandotte's costs represent considerable sums for site development because the firm is starting



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ENGINEERING

from scratch. "But," they say, "GAF had site clearance problems, too."

The same engineers are proud of yields by the process. "The percentage yields are now in the upper 60s," says Ralph Landau, executive vice-president. Catalyst life by the SD process has been estimated at nine months. Landau's only comment: "It's longer than that."

But the crux of the matter, SD feels, is the question of optimum design. It may be possible, but highly uneconomic, it says, to boost either catalyst life or yield significantly. Finally, the firm points out that when presently contracted-for plants have been built, it will have engineered plants whose total output comes to approximately 350 million lbs./year. Moreover, it has considerable operating data to back up its claims on costs.

Another argument put forth by some in favor of air oxidation is that Carbide uses it. Carbide, they contend, probably knows more about making ethylene oxide than anyone else, and its sister company, Linde, knows as much as anyone about making oxygen. Certainly, Carbide has investigated the possibility of using oxygen for ethylene oxide. Yet, it has recently revealed it has made improvements in the process that will boost its capacity by 60 million lbs./-year (*CW, Technology Newsletter, June 14*). And these improvements did not involve a switch to oxygen.

Because few people outside the company know just what Carbide has done, reasoning like that is specious when applied to the relative merits of the Shell and Scientific Design processes. That's an issue that can be decided only after long periods of plant operations under comparable conditions.

•

HEF Pilot: The high-energy-fuel pilot plant designed and built by AFN, Inc. (jointly owned by American Potash & Chemical Corp., Food Machinery and Chemical Corp., and National Distillers & Chemical Corp.), is undergoing final tests at Henderson, Nev. The new unit was constructed under sponsorship of the Air Force to develop a large-scale production process for manufacturing a new alkyl borane. Capacity of the plant is small, says AP&CC; details of plant and fuel are classified.

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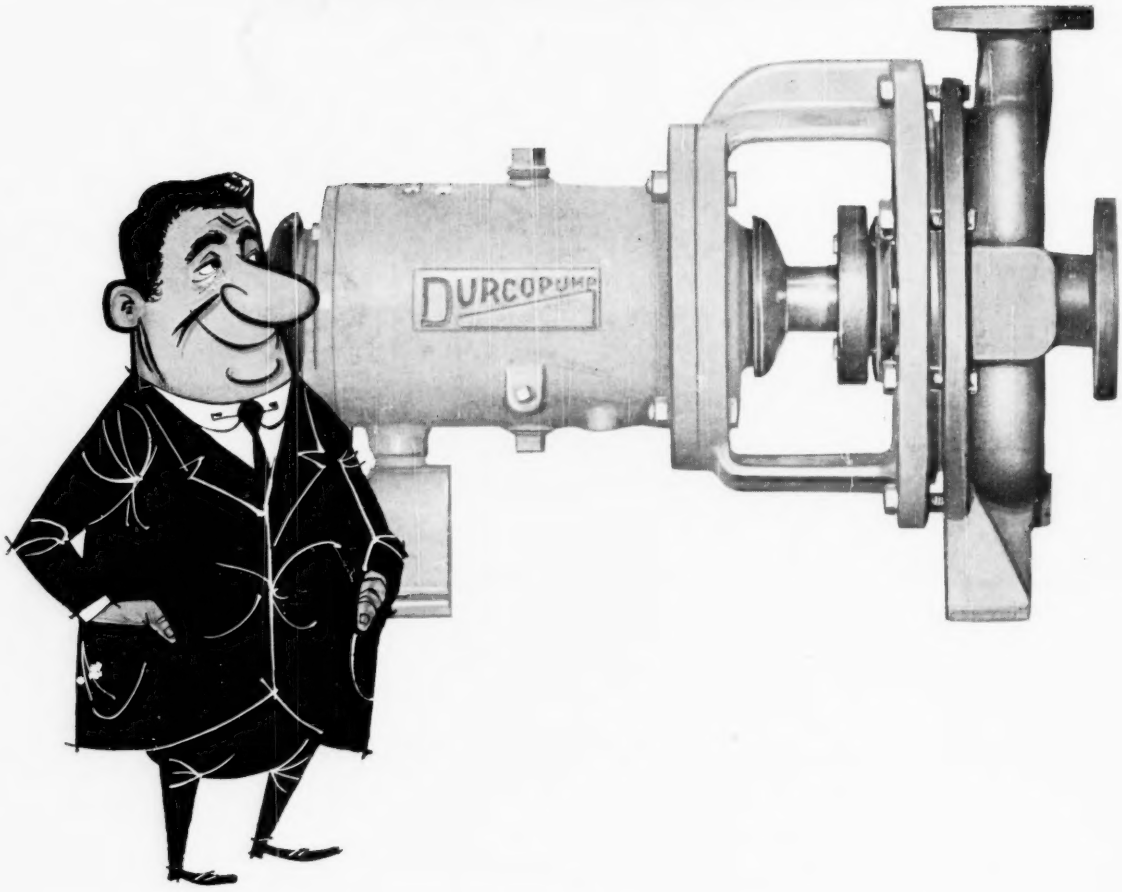

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